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March 1960 *In Two Sections Section 1*

Using the C-V-P Relationship in Planning

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Types of Government Contracts

■

When the Question is Make-or-Buy

N.A.A. BULLETIN

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Practical Applications of Cost-Volume-Profit Analysis

by JAMES D. WILLSON

THE SUCCESS of a top business executive today depends in large part on his ability to deal effectively with probable conditions of tomorrow. In such a task he needs knowledge of the economic characteristics or structure of the business he manages, which the accountant can provide him. The principal accounting official should constantly make available to the chief executive such information, in readily understandable reports, to enable him to evaluate the hazards and recognize the potentials in the various business alternatives available.

This entire field of "profit planning" has become associated with the break-even analysis, or the cost-volume-profit inter-relationship. We will not concern ourselves here with the usual preparation of such planning or control devices as variable budgets or forecasts. It is assumed that the reader has a reasonable knowledge of the principles related to these areas of planning and control. Our starting point is in a more sophisticated area—the application of the break-even analysis and related data in profit planning techniques. Let us consider the forecast, for instance. What purpose does it serve? Is it satisfactory? How do we know? If your company is typical, there are many useful ways of putting cost-volume-profit analysis to work. Such a technique is not merely a means of determining at what point income equals outgo and the business "breaks even". The dynamic company of today wants more than to just break even. Profits or the expectation of profits must be in the picture, or the incentive under the free enterprise system is gone.

The significance of this type of thinking may be illustrated by some of the questions which management is prone to ask and which accounting executives should be ready to answer, or assist in development of the answer, by the use of break-even analysis:

1. Does the forecast represent a reasonable profit objective? (More particularly for this purpose, are costs and expenses in proper relationship to income?

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2. What will be the operating profit or loss as X sales volume?
3. What profit will result from a fifteen percent increase in sales volume?
4. What additional sales volume is necessary to produce X dollars of operating profit?
5. What additional sales volume is necessary to offset a ten percent reduction in selling price?
6. If the company can reduce fixed costs by X dollars and achieve a five percent reduction in material costs, what will be the effect on income?
7. What is the required sales volume to meet the additional fixed charges from the proposed plant expansion?
8. What sales volume is needed to provide for all costs in Territory Y?

Can you give an intelligent answer to intelligent questions of this nature as applied to your company? If you cannot, take heart. The techniques to develop answers to these questions are essentially quite simple.

Basic Assumptions in Cost-Volume-Profit Analysis

Before discussing some adaptations of the cost-volume-profit analysis to planning and control, a review of a few simple fundamentals might be helpful. The effectiveness of our application depends in large part on proper assumptions relating to costs and profits. The economic structure of a company may be portrayed in the more simple break-even chart to depict merely the profit or loss effect of an increase in volume of sales as related to a ratable increase in variable costs, with a sales income line, a fixed cost line, and a line of variable costs. It may also be portrayed in a more refined but complex presentation, as in Exhibit 1, setting forth the relationships to sales volume of various costs and expenses. Regardless of the degree of complexity of the analysis, the principal assumptions on which such a study is based are:

1. Unit selling prices will not change with volume.
2. Costs and expenses can be segregated with reasonable accuracy into their fixed and variable components.
3. Fixed or standby costs will remain constant in the aggregate within the limits of the study.
4. Variable costs will vary generally in a constant ratio, i.e. in direct proportion to volume.
5. Where several products are involved, the mix will remain constant.

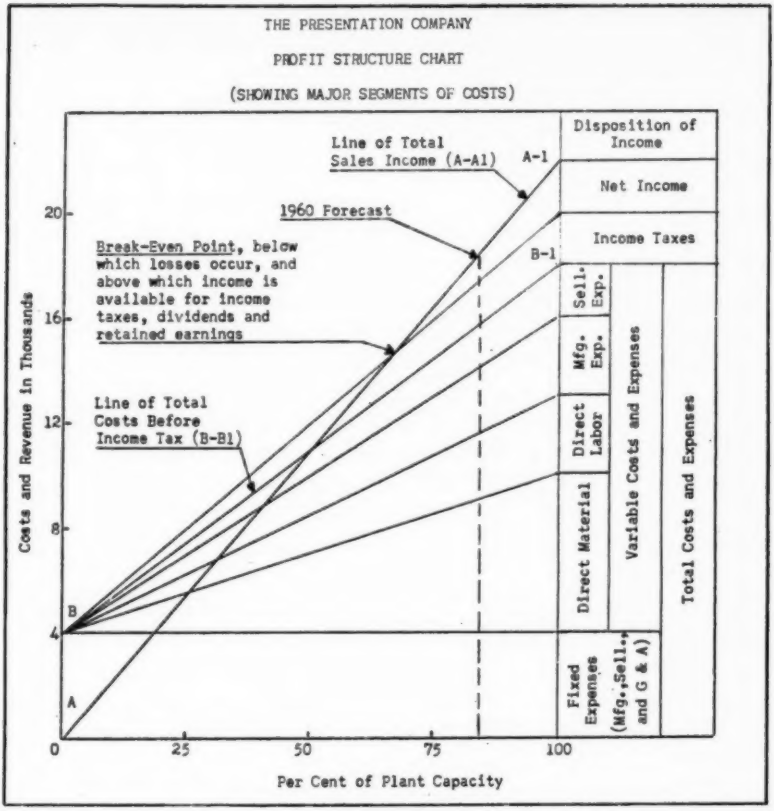

EXHIBIT 1

When the proper cost segregations are known, income, costs, and the break-even point may be determined, with or without a chart. Whether or not it is decided to use the formalized chart in the determinations, the mathematical equation is:

$$\text{Break-even point} = \frac{\text{Aggregate fixed expense}}{1 - \dfrac{\text{Variable costs}}{\text{Sales}}}$$

The denominator, which is equal to the ratio of variable income to sales (marginal income ratio), represents that share of the sales dollar which is available to contribute to fixed costs and, if adequate, to income. It is a highly significant ratio. In analyzing economic behavior, this relationship becomes a much more useful concept than the break-even point itself.

Using Break-Even Analysis to Test the Forecast

For illustrative purposes, we will consider the Sample Company with an economic structure such as that shown in Exhibit 2. It is to be observed that not only have fixed and variable costs been segregated but also the variable costs for each major function or cost segment have been translated into their applicable percentages of the net sales dollar. This information can now be applied in an evaluation of the reasonableness of the forecast. Typically, a projection is compared with some past year, usually the immediately preceding year, to determine whether or not it appears satisfactory. Such a comparison has value. It may be a gauge as to the adequacy of the sales volume and, in a general way, it may raise questions about cost or expense levels. However, such a comparison is not as sharp a tool as is available. Most of the time, the sales level and product mix in the forecast year will not be identical with that of the past year. Therefore, it may be difficult to measure more precisely the propriety of the costs and expenses in relationship to sales volume. To further complicate the problem, management, when looking at a higher sales volume and a net income which appears more favorable, tends to be less critical. In most instances, if net income expressed as a percent of sales is greater than the preceding year, the forecast is gleefully pronounced satisfactory.

Why not use a superior tool which permits a more effective evaluation of the volume factor? Once management has agreed upon a reasonable sales objective, a volume for the year under forecast, then it becomes practical to measure the proposed forecast against the break-even structure, i.e., to apply the break-even economic structure of the company to the projected sales volume. Essen-

THE SAMPLE COMPANY

PROFIT STRUCTURE

Description	Fixed Costs	Variable Costs Total	Variable Costs % Net Sales	Combined
Net sales				$10,000,000
Costs and expenses:				
Direct material	$	$4,000,000	40.00%	
Direct labor		1,000,000	10.00	
Manufacturing expenses	500,000	1,000,000	10.00	
Selling expenses	400,000	100,000	1.00	
Research and development expenses	250,000	50,000	.50	
General and administrative expenses	150,000	50,000	.50	
	$1,300,000	$6,200,000	62.00%	7,500,000
Profit before income taxes				$ 2,500,000

EXHIBIT 2

tially, we are saying that management should decide upon reasonable cost-profit-volume relationships and that this standard should be used as a measure of the forecast. The results of the application of the break-even factors, as shown in Exhibit 2, to a projected sales volume (standard profit structure) and the comparison of such results with the aggregate costs and expenses as set forth in an illustrative forecast, are shown in Exhibit 3. It is to be noted that percentage relationships are developed to aid in detecting out-of-line conditions. The exhibit portrays one of the basic considerations in the preparation of forecasts, i.e., that the company must not be allowed to develop or assume a less favorable cost structure. Hence, it is necessary to apply some overall tests quite distinct, for example, from individual departmental budget performance.

THE SAMPLE COMPANY

BREAK-EVEN ANALYSIS OF FORECAST

Fiscal 1960

Description	Application of Standard Profit Structure	Tentative Forecast	Forecast Over (Under) Standard Amount	Forecast Over (Under) Standard %
Net sales	$12,500,000	$12,500,000	$	
Cost of sales:				
Direct material	$ 5,000,000	$ 5,250,000	$250,000	5.00%
Direct labor	1,250,000	1,310,000	60,000	4.80
Manufacturing expenses	1,750,000	1,820,000	70,000	4.00
Total	$ 8,000,000	$ 8,380,000	$380,000	4.75%
Gross margin	$ 4,500,000	$ 4,120,000	($380,000)	(8.44%)
Operating expenses:				
Selling	$ 525,000	$ 540,000	$ 15,000	2.86%
Research and development	312,500	310,000	(2,500)	(.80)
General and administrative	212,500	190,000	(22,500)	(10.59)
Total	$ 1,050,000	$ 1,040,000	($ 10,000)	(.95%)
Profit before taxes	$ 3,450,000	$ 3,080,000	$370,000	(10.72%)
Other data:				
Break-even point	$ 3,421,050	$ 3,714,290	$293,240	8.6%
Marginal income ratio	.38	.35		

EXHIBIT 3

The greatest dollar increase and relative increase is in prime material costs. This 5 percent or $250,000 increase must be analyzed to determine whether the cost increase results from changes in product mix or from cost increases in any given product line. The initial break-even application has isolated this appar-

ently excessive cost relationship. Now it should be analyzed in more depth and a decision made as to an acceptable plan. Perhaps the product mix is not the optimum believed to be attainable in the forecast year. Perhaps action can be taken on cost increases to reduce or eliminate them. The next largest relative increase, amounting to $60,000, is in direct labor. A similar analysis should be made to localize the cause and seek an improvement in the plan.

Next, manufacturing expenses have increased by 4 percent or $70,000. Departmental budgets should be reviewed to determine the areas of greatest increase and causes should be determined. Management must then decide what corrective action need be taken. If, for example, the increase is in maintenance expense, is it sound to defer projects? What is the best approach when considering the longer term interests of the business? Similar analyses should be

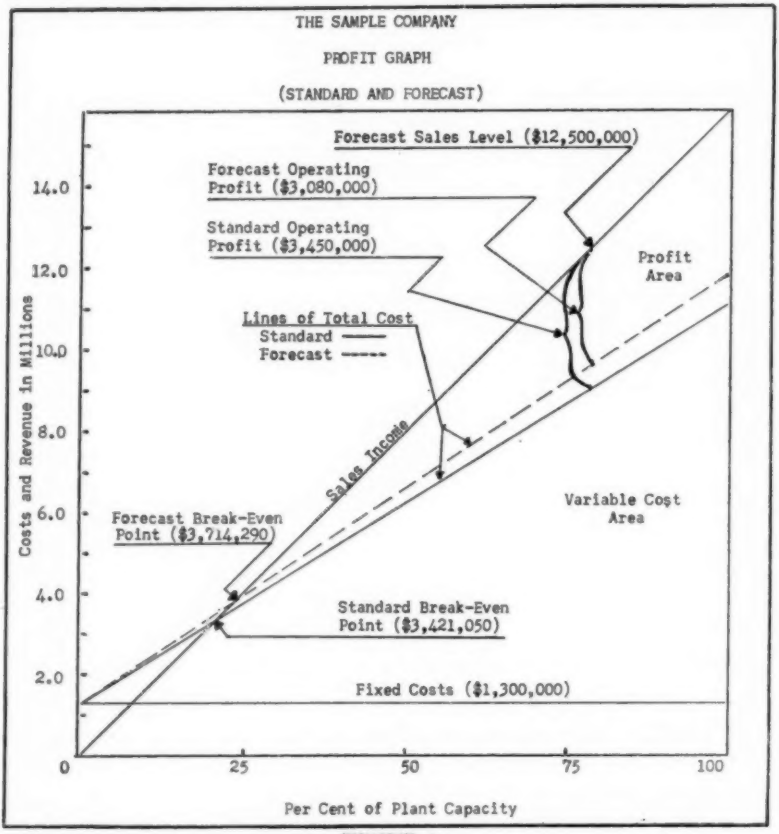

EXHIBIT 4

made of the other expense areas. If expenses are under the standard, the accountant should ascertain that no omissions have been made erroneously.

It is to be observed that the break-even point has risen by 8.6 percent to $3,714,290. Perhaps a better way to state the case is that the forecast is based on a somewhat changed cost structure. This change may be shown graphically as in Exhibit 4. The solid lines indicate the acceptable cost-volume-profit structure and the dotted lines reveal the condition as planned in the forecast. Incidentally, any change in these relationships can be readily shown on the graph, whether they appear in sales, variable costs or fixed expense.

In poor economic weather, a reasonable margin of safety is necessary. Accordingly, in the Sample Company, if management agrees that the standard profit structure must be maintained, every element should be analyzed and explored by the accountant so that the final business plan for the ensuing year retains the characteristics of this structure. As an alternative, once the most satisfactory cost-volume-profit relationship is determined, including the proper product mix, then the possibility of securing additional sales volume to offset cost increases is to be considered.

Other Uses of Cost-Volume-Profit Data

A knowledge of the economic structure of the business, together with the related analysis, can identify areas of cost increases and, as illustrated, permit an evaluation of the forecast. In addition, such information can provide answers to other typical questions. The value of the cost-volume-profit concept is inherently in the facility with which volume can be treated as a variable factor. Because of considerations relating to the market or to expansion, management many times desires information concerning the results of a contemplated action, such as what the operating profit would be at X dollars sales volume or what the effect on operating profit would be if X percentage increase in sales volume were realized, etc. The marginal income ratio and the related segregation of fixed expense simplify the solution of such problems.

Operating profit at any given sales volume—Using the Sample Company's profit structure, what would be the operating profit at an annual sales level of $13,000,000? The operating profit will be the marginal contribution (amount of sales income less all variable costs and expenses) less the fixed expense:

Contribution margin	=	$13,000,000 × .38
	=	$ 4,940,000
Less fixed expense		1,300,000
Equals operating profit of		$ 3,640,000

Effect on operating profit of a given percent increase in sales volume—In

setting the sales objective each year or for several years, management typically likes to know the profit result at any number of sales levels expressed as amounts or percentages of increase. The answer may be determined easily from a reading of a cost-volume-profit graph as shown in Exhibit 4. This increased flexibility is a tremendous advantage of the chart approach. However, results from each requested percentage increase also can be individually calculated. If the present sales volume is $10,500,000, with our marginal income ratio of .38, the computation of a 15 percent increase in sales is as follows:

Sales increase = $10,500,000 × 15% = $1,575,000
At marginal income ratio of .38
Produces an increase in operating profit of $598,500

In such an instance, with no change in fixed expense, the operating profit is simply the sales increase multiplied by the marginal income ratio.

Sales volume required to produce X dollars of operating profit—In planning, management quite often decides that, for financial or other considerations, a given profit must be attained. The question then will naturally arise as to the sales volume necessary to produce it. In a calculation of this type, the desired operating profit becomes, in effect, the equivalent of fixed expense. If the desired operating profit of the Sample Company is $4,200,000, then the simple computation and result are as follows:

$$\text{Required sales volume} = \frac{\text{Fixed expense} + \text{Desired operating profit}}{\text{Marginal income ratio}}$$

$$= \frac{\$\ 1{,}300{,}000 + \$4{,}200{,}000}{.38}$$

$$= \$14{,}473{,}700$$

Additional sales volume needed to offset a reduction in selling price—The sales department may insist that the present low sales volume is due to prices which are out of line with competition. It may advise a reduction of 10 percent in these prices. We will assume that the company has a sales volume of $10,500,000, with fixed expenses of $1,300,000, and a marginal income ratio of .38. With a 10 percent reduction in selling prices, what sales volume is needed just to maintain present operating results? Our initial step is to calculate the present operating income as follows:

Marginal income	$10,500,000 × .38
	$ 3,990,000
Deduct fixed expense	1,300,000
Present operating income	$ 2,690,000

Next, we must adjust to the changed marginal income ratio (or the variable cost ratio).

$$\text{Sales volume to offset reduced selling price} = 1 - \frac{\text{Desired profit} + \text{Fixed expense}}{\left(\frac{\text{Present variable cost ratio}}{1 - \text{Proposed \% reduction in selling price}}\right)}$$

$$= \frac{\$2{,}690{,}000 + \$1{,}300{,}000}{1 - \left(\frac{.62}{1 - .10}\right)} = \frac{\$3{,}990{,}000}{.3112} = \$12{,}821{,}000$$

The required sales volume of $12,821,000 represents an increase of about 22 percent over the present level. The ability to secure such an increase should be explored in terms of both sales potential and plant capacity.

Effect of changes in fixed expense and variable cost ratios—Since the objective of business management should be the earning of the maximum return on invested capital, consistent with proper social objectives, there is often a continuous search for reduced costs. In the case of the Sample Company, assume that management, after some study, feels the "normal" or standard profit structure may be improved. As an example, it may be concluded that direct material costs may be reduced 10 percent through certain substitutions and that fixed expenses may be lowered by $250,000 annually. Then the question may be asked, "What would the probable operating profit be at a sales level of $12,000,000 annually?" The answer could be calculated using the profit-structure shown in Exhibit 2:

The new variable cost ratio = Present variable cost of material less 10% plus other variable costs
= (.40 less 10%) + .22 = .58

The new marginal income ratio = 1 — variable cost ratio = 1 — .58 = .42

Now operating results may be quickly determined as follows:

Marginal income = Sales volume × marginal income ratio
= $12,000,000 × .42 = $5,040,000

The $5,040,000 marginal income less the revised fixed expense of $1,050,000 ($1,300,000 — $250,000) will produce a more favorable operating income of $3,990,000. If preferred, a more detailed comparison of the present operation and the $12,000,000 sales level may be made as follows:

Description	Present		Higher level	
	Amount	% Net sales	Amount	% Net sales
Net sales	$10,000,000	100.00	$12,000,000	100.00
Variable costs	6,200,000	62.00	6,960,000	58.00
Marginal income	$ 3,800,000	38.00	$ 5,040,000	42.00
Fixed expense	1,300,000	13.00	1,050,000	8.75
Operating income	$ 2,500,000	25.00	$ 3,990,000	33.25

Advisability of plant expansion—Sooner or later most progressive businesses are faced with a problem of plant expansion. This solution should not rest merely on available funds. Rather, management should have a full realization of the economic questions involved and here, again, cost-volume-profit analysis can be helpful. The chief executive might find break-even analysis valuable in providing information needed in a critical review of the proposed commitment, answering such points as:

1. Relative break-even points.
2. Sales volume required to earn the present level of profits.
3. Sales volume necessary to earn the same rate of profit on the proposed facility as on the existing one.
4. Maximum profit potential.

The development of these criteria is simply the application of the basic formula already discussed. There are simply more aspects to the problem and perhaps more sales attainment levels to consider before making an intelligent commitment of long-term funds.

Planning for adequate facilities preferably should take place sufficiently ahead of the date when the plant and equipment are needed for operations. In our example, the Sample Company, the sales forecast is already at the $12,500,000 level. However, management is of the opinion that the full plant capacity of $15,000,000 will be required within the next eighteen months. Therefore, assume these facts, using the profit structure (Exhibit 2) of the company:

Maximum annual earnings of the company with present facilities:

Net sales	$15,000,000
Costs and expenses:	
Variable (62% of net sales)	9,300,000
Fixed	1,300,000
Total	$10,600,000
Income before taxes	$ 4,400,000
Federal income tax (50%)	2,200,000
Net income	$ 2,200,000

Annual fixed expense of new plant	$ 700,000
Desired annual income (net) on new investment	$ 140,000
Maximum sales volume of new plant	$ 8,600,000

On the basis of this information, these determinations can be made:

BREAK-EVEN POINTS

$$\text{Present facilities} = \frac{\text{Fixed costs}}{\text{Marginal income ratio}} = \frac{\$1{,}300{,}000}{.38}$$

$$= \$3{,}421{,}050 \text{ sales volume.}$$

$$\text{Proposed facilities} = \frac{\text{Present} + \text{Additional fixed expense}}{\text{Marginal income ratio}}$$

$$= \frac{\$1{,}300{,}000 + \$700{,}000}{.38} = \$5{,}263{,}200 \text{ sales volume.}$$

SALES VOLUME REQUIRED

$$\text{To earn existing income} = \frac{\text{Present fixed expense} + \text{Additional fixed expense} + \text{Existing income}}{\text{Marginal income ratio}}$$

$$= \frac{\$1{,}300{,}000 + \$700{,}000 + \$3{,}450{,}000}{.38} = \$14{,}340{,}000 \text{ sales volume.}$$

$$\text{To earn a given return on investment} = \frac{\text{Present fixed expense} + \text{Added fixed expense} + \text{Present return on investment} + \text{Return (before taxes) on new investment}}{\text{Marginal income ratio}}$$

$$= \frac{\$1{,}300{,}000 + \$700{,}000 + \$3{,}450{,}000 + \$280{,}000}{.38} = \frac{\$5{,}730{,}000}{.38}$$

$$= \$15{,}000{,}000 \text{ sales volume.}$$

MINIMUM EARNINGS POTENTIAL WITH NEW PLANT

Net sales (capacity)		$23,600,000
Costs and expenses		
Variable (62% of net sales)	$14,632,000	
Fixed or continuing expenses	$ 2,000,000	$16,632,000
Profit before income taxes		$ 6,968,000
Federal income taxes (50%)		3,484,000
Net income—potential		$ 3,484,000

These determinations may be summarized for management somewhat in this fashion:

Description	*Present facilities*	*Prospective facilities*	*Increase*
Annual break-even sales volume	$ 3,421,050	$ 5,263,200	$ 1,842,150
Annual sales volume to earn existing income	12,500,000	14,340,000	1,840,000
Annual sales volume to earn desired return on new facility	12,500,000	15,100,000	2,600,000
Maximum sales volume	15,000,000	23,600,000	8,600,000
Maximum profit potential	2,200,000	3,484,000	1,284,000

A prudent management will consider carefully its ability to secure and maintain, at the assumed prices, an additional sales volume of at least $2,600,000. Moreover, because of a very favorable marginal income ratio and the consequent relatively small increase in sales needed to provide an adequate return, further thought should be given to

1. Possible or probable competitive action and the need for price changes to discourage competition.
2. The prospects of achieving a more substantial increase in sales to utilize the new facilities and realize more of the profit potential.

Uses of Cost-Volume-Profit Analysis for Part of the Business

Previous illustrations have dealt with the use of cost-volume-profit analysis for the business as a whole. Yet, the same approach may be applied to problems relative to individual product lines, territories, methods of sale, channels of distribution, or any particular segment of the business which is under scrutiny. In all of these decisions, the significant factors are the marginal income ratio and the fixed expense or cost. Where both direct and allocated costs are involved, several different break-even points may be determined. For example, suppose these conditions exist in a sales territory:

Direct and continuing territory selling expense	$310,000
Marginal income ratio	.25
Allocable share of home office (fixed) expense	$130,000

The sales volume required merely to cover the direct territorial fixed expense would be:

$$\frac{\text{Direct fixed expenses}}{\text{Marginal income ratio}} = \frac{\$310{,}000}{.25} = \$1{,}240{,}000 \text{ sales volume.}$$

The annual sales volume sufficient to cover the direct expenses and allocated home office fixed expense would be:

$$\frac{\text{Direct expense} + \text{allocated expense}}{\text{Marginal income ratio}} = \frac{\$310{,}000 + \$130{,}000}{.25} = \$1{,}760{,}000 \text{ sales volume.}$$

. . . And in Control

The preceding discussion has related principally to the planning phase of business, that is, to showing what must be done to achieve a given objective. Once the best plan has been selected and the goal has thus been defined, the same cost-volume-profit analysis can be used for control purposes. Charts may be helpful in such an approach. One such application is a sales control chart as shown in Exhibit 5. This chart shows three important factors cumulatively: actual sales volume, sales forecast, and sales volume required to break-even. Based on existing sales plans, the chart shows that eight months of sales are required just to meet all costs and expenses and that profits will be realized for the year only after the cumulative sales level has been attained.

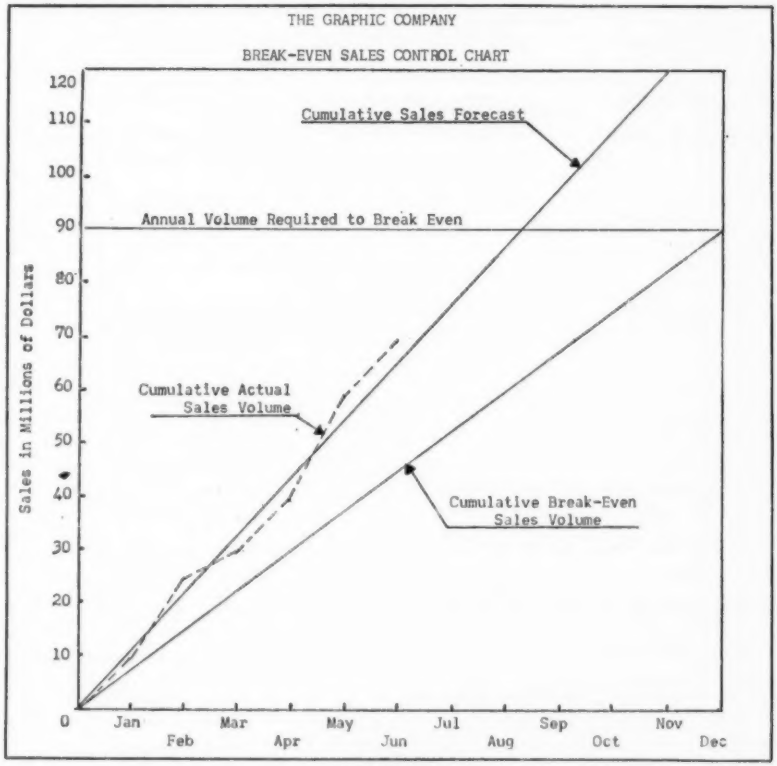

EXHIBIT 5

Another chart designed to show progress—or lack of progress—in keeping with the acceptable cost-volume-profit structure is illustrated in Exhibit 6. In

this application, monthly costs are charted against the corresponding sales level to detect out-of-line trends.

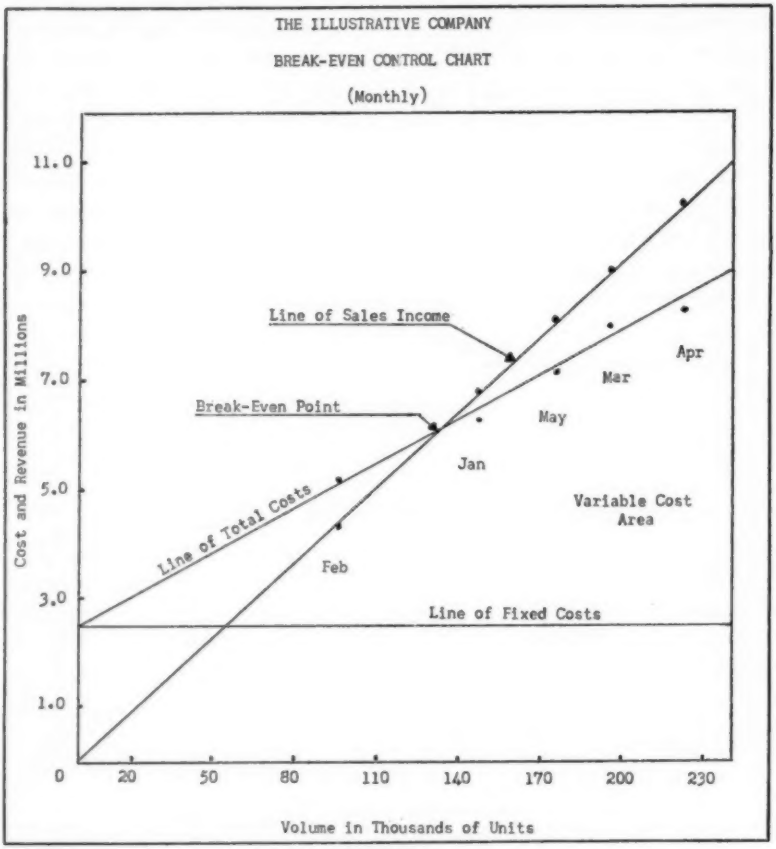

EXHIBIT 6

A Major Help in Answering Many Questions

The applications of the cost-volume-profit relationship, illustrated in this article, are suggestive only. Further refinements and modifications may be found necessary, desirable, and useful in your particular business. Moreover, as conditions change, the desired profit structure must be adjusted. Nevertheless, there are a great many questions that the cost-volume-profit relationship may help to answer. It is one facet of putting facts and figures to work for management and it is one of the more interesting aspects of accounting planning and control.

Programming for Control of Contract Performance

by CECIL R. HOLLIS

THE PERFORMANCE OF A CONTRACT is in essence little different from the normal function of producing a consumer product; the same basic principles of sound management—organization, planning and control—apply to both. If we think of organization, planning and control as a tripod with each of its three legs performing an individual function but unable to stand without the support of the others, we see an illustration of the balance that must be realized to manage successfully. Successful contract performance is an indication of management's ability to mix correctly these three ingredients to achieve customer satisfaction and an adequate profit for the company. The ingredients must be carefully analyzed before, during and at the close of the contract, in order to attain the objectives desired.

Pre-Contract Planning Function

The advantages of planning for contract performance are manifold:

1. Pre-determination of control elements within a contract promotes a reporting structure which will speed up the reporting of results.
2. Assignment of specific responsibilities for performance of these control elements eases communications, allows delegation of authority and promotes the technique of management by exception.
3. Proper coding of accounting information reduces clerical effort materially and permits the use of mechanical or electronic data processing methods.
4. Assignment of responsibilities for contract funds simultaneously with performance responsibilities assists in establishing performance standards at the operating levels. This also allows a greater flexibility for the making of decisions and controlling action at the working level.

The planning phase of a contract begins when a company determines it has a product-line capability. This determination may be the result of independent

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research, sponsored research, modification of existing products or, simply, the realization of capabilities for existing products, facilities and equipment. During this preliminary planning, the company has considered and evaluated all factors which may result in the company submitting an unsolicited proposal to the customer. At this stage, it is vital that planning become formalized, no matter what or how inconclusive the existing information is. The act of formalizing the plans requires up-dating of information as changes are developed. It also provides for the communication of plans and objectives to responsible people and organizational units throughout the company. In addition, it provides the beginning of the historical record for review and assistance in development of future program plans.

Designation of Responsibility Areas

The determination of organizational responsibilities is the first step in establishing an approach to contract performance. A typical contract should be analyzed and the responsibilities of various functional areas, as well as the lines of communication and sequencing of events, should be established. Thus, a sound organizational approach must be outlined and followed. The designation of organizational areas of responsibility should conform to the existing structure of the company. The major functional areas of responsibility for a contract should be flow-diagrammed to achieve complete understanding. It is virtually impossible to effectively superimpose a project type organization on an existing line organization. The confusion which can result because of dual authorities established can more than offset the advantages gained by the planning function. Make what adjustments must be made in the existing line organization to accommodate the contract but watch carefully for areas of overlapping authorities and responsibilities.

The six major functional areas normally concerned in contract accomplishment are briefly explained below:

1. Planning and programming for proposals—primarily concerns top management responsibility in reviewing and approving programs and requirements.
2. Proposals—involves the responsibilities of sales price estimating and finance in establishing estimates, pricing information and submitting proposals for pre-negotiation analysis.
3. Negotiations—concerns relations between sales functions and the customer in arriving at an agreement and a formal contract.

4. Contract performance planning—results from joint action on the part of sales, price estimating, finance and operations departments. It establishes contract analysis framework, contract cost allocations by item per original estimates and the development of appropriation control ledgers in correlation with contract estimates. To ensure accomplishment, one individual or department must be assigned the responsibility for coordination of performance planning.

5. Allocation and appropriation funding—involves operations, finance and contract administration functions in establishing budgets, appropriation funding control and the proper coding and data processing to produce performance reports and records.

6. Reports and records—are primarily the responsibility of the finance department. The operations function must supply physical completion status reports and estimates for what is required to complete the contract. The planning department monitors such reporting and may summarize schedule positions for management.

Planning the Contract

The initial formalization of planning should cover five items. It should represent the best possible conclusions through evaluation of available knowledge and information. The five items to be considered are:

Master Schedules. It is not only important to know where you are going but, also, when you plan to arrive. The schedule should pinpoint all significant targets or mileposts known in the program, in order to achieve the program objectives of the company. Exhibit 1 shows such a schedule in chart form (figures in this and subsequent exhibits are for illustrative purposes only). The responsibility for the development of the master schedule is that of the planning department or its equivalent in a given company.

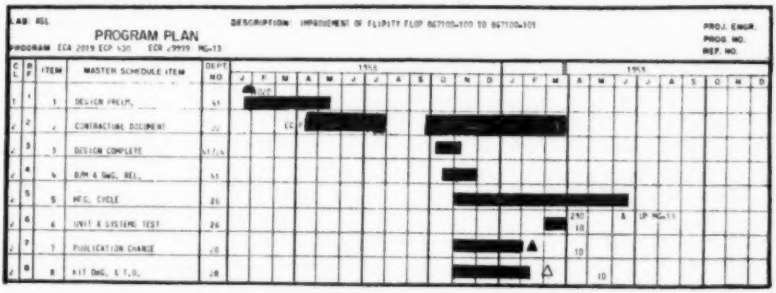

EXHIBIT 1

RF	MANPOWER	TYPE	HEAD COUNT	DEPT NO.	1958 J	F	M	A	M	J	J	A	S	O	N	D	1959 J	F	M	A	M	J	J	A	S	O	N	D
11.	SCIENTIFIC & ENG.	1AD	EST	41										10	10	10	1	1	1	1	1							
			ACTUAL			1	2	3	4	1				9	10	12	1	1										
12.	ADMIN.	4AD	EST	42					1	1	1						1											
			ACTUAL						1	1	1						1											
13.	PRODUCTION & SUPPORT	4AD	EST	26											5	30	30	30	30	20	10	10	5	5	5	5	2	
			ACTUAL												4	28	22	30										
14.	TECHNICAL & SKILLED	3ND	EST	26											1	1	1	1	1	1								
			ACTUAL											OK	1	1	1	1										
15.	SUPPORT	4AD	EST	28											2	5	9	8	5	4	1	1	1	1	1	1	1	
			ACTUAL												1	7	10	6										
16.	SCIENTIFIC & ENG.	1AD	EST	24					1					1	1	1												
			ACTUAL						1	1				1	1	1												
17.	X		EST																									
			ACTUAL																									
18.			EST	TOTAL		1	2	3	7	1	1			11	19	47	42	40	37	26	12	11	6	6	6	6	3	
			ACTUAL			1	2	3	6	3	1			10	17	49	45	38										

RF	FACILITIES	BLDG.	M & E	TYPE	DEPT NO.	1958 J	F	M	A	M	J	J	A	S	O	N	D	1959 J	F	M	A	M	J	J	A	S	O	N	D
19.	NEW STAT. IN SYS. TEST	X		NRL	16										$12,100	[redacted]												
20.	PRODUCTION TOOLS & TE		X	C2RH	16	ASSEMBLY FIXTURE #897643									$1,000	[redacted]												
21.	X																											
22.																												
23.																												
24.															$13,100													
25.																												

EXHIBIT 2

Manpower. Once the schedules have been established, manpower by quantity and types should be projected. Such projection cannot be the mere division of scheduled days by working man-days. It also must define the types of manpower required and departmental or divisional responsibility. Exhibit 2 shows a chart of typical manpower requirement by department.

Facilities. The determination of facilities required to support the program is all important. Facility requirements can be charted effectively, as shown in Exhibit 2.

Material. Basic and major items of material required should be scheduled and identified as to source, date required, categories, and types of procurement required. These requirements can be charted in a manner similar to schedules and facilities.

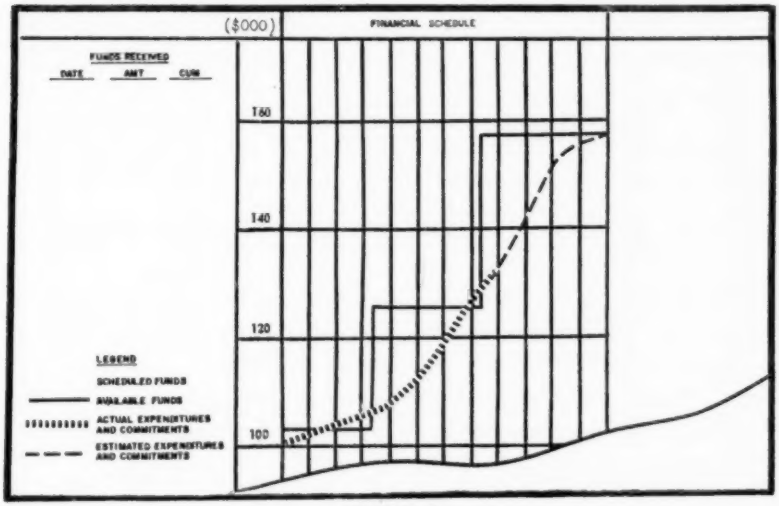

EXHIBIT 3

Finance. The financial schedules include, on a calendar basis, scheduled funds, available funds, actual expenditures and commitments to date. (Estimated expenditures and commitments required to complete the contract programs also should be included for fixed-price contracts). The financial schedule, illustrated in Exhibit 3, is a monthly representation of the over-all status of a particular contract. The graphic presentation provides management with a quick picture of the financial status of each contract.

To keep a planning system meaningful and not mechanical is a real art of management. The inter-relationship of the various items in the planning process

is of primary importance. Sales cannot exist without facilities. The return on facilities cannot be calculated without firm assumption on sales. Division expenses cannot be built into a picture without ideas on customer requirements, facility utilization and production levels. All up and down the line, factors which go into the plan must be coordinated at the operating level so that they reflect a true picture in relationship to each other. In order to operate within this system, the executive, at plant and division levels, must be able to relate operation of his plant, materials and people. The plan must be coordinated, formalized, approved and communicated.

The Over-All Control Program

When program planning has been initiated, all subsequent action is coordinated on the basis of established program plans. Additions to or deviations from the plan must be properly approved and recorded. The control mechanism for ensuring this coordination includes:

1. A formal plan for work authorization.
2. A system of fund appropriation and allocation.
3. A method of cost gathering and reporting which includes adequate coding.

This threefold control mechanism is best organized, in most circumstances, as a joint responsibility of the controller's and the planning functions. The latter is charged with the responsibility of defining the scopes of work involved in detail sufficient for it to be easily divided into controllable elements. The controller's function is responsible for the allocation of funds to these controllable work elements and the assignment of a basic cost code structure.

It cannot be overemphasized that control begins at the earliest possible moment, almost, one might say, as soon as the "pup" is born. The basic concepts of this philosophy of control are simple, namely:

1. No work or funds are expended without written authorization.
2. No work authorization is issued until approved plans and schedules have been completed in defined and controllable work elements.
3. No funds are allocated or appropriated except on the basis of approved program plans and schedules. The use of such funds is authorized only as set forth in the written and approved work authorization.

Work Authorization Control

The formal plan for work authorization should encompass all phases of a program and, to repeat, it should be clearly established that no work of any nature concerning the program be performed without coverage by a written and properly approved work authorization. Such approvals should be made by the chief operating executive of the company or division. Generally, a contract or product program will include one or more of the following phases:

1. Research.
2. Development.
3. Contract bidding (or market research and testing).
4. Production.

These basic phases may be expanded to include other controllable phases, as required by individual company circumstances. There may be a contract bidding phase between research and development or a modification or service installation phase following production. Each company must determinne what major areas are to be authorized and controlled and at what levels such authority is to be exercised. The format of the work authorization should follow individual company requirements. It should incorporate the scope and description of work to

WORK AUTHORIZATION

No. 221

Customer Signal Corps

Date 0-0-00

Customer Order No. WXYZ543261

Supplement

REF: MASTER PLANNING PUBLISHED SCHEDULE 1 November 1959

Quantity, Statement of Work, Budgets, etc.

Produce (4) each - XYZ Gizmos with ultra high memory units as described in Contract Brief #1246 and in accordance with program plan of 1 November 1959 $545,000.00.

Manufacturing operations, B. B. Jones, Manager, is designated the organization responsible for the overall performance of this program.

The basis for the allocation of funds as authorized is attached.

Issued By C. R. Hollis

APPROVED

A. B. Smith
Operation Manager

John Doe
Comptroller

EXHIBIT 4

be performed, who is to perform it (area of responsibility), when it is to be performed (schedule) and the budgeted funds to be expended in accomplishing the work. The form should be prepared in sufficient copies to be distributed to the personnel who are charged with the decision-making responsibilities of the program. A simple illustration of a work authorization form is depicted in Exhibit 4.

Fund Appropriation and Allocation

Any contract performance control program requires that control over costs and performance be obtained at the point of decision in recognition of the concept of responsibility reporting. To accomplish this objective, financial planning is required. Contractual work programs or projects must be broken down into controllable and measurable elements, tasks or phases of work for which managerial and operating responsibility can be assigned and performance meas-

FUND ALLOCATION AND APPROPRIATION DATA

RESP	ACCOUNT DETAIL			PERFORMANCE SOURCE			AMOUNT					DESCRIPTION
ACT	CONTR	ITEM	SUB ITEM	ACT	DEP	SEC	ITEM	SUB-ITEM	ACTIVITY	DEPT.	SECTION	
41	365	01					1000					MX-1 TRAINER SET
41	365	01					1000					
41	365	01	UA					100	100	100		
41	365	01	01					900				
41	365	01	01	UA					100	100		
41	365	01	01	41					400			
41	365	01	01	41	UA					50		
41	365	01	01	41	21					225		
41	365	01	01	41	25					125		
41	365	01	01	31					200			
41	365	01	01	31	19					200		
41	365	01	01	16					200			
41	365	01	01	16	24					200		
							1000	1000	1000	1000		

EXHIBIT 5

ured. After establishment of these controllable elements, funds can be appropriated to the decision point which establishes the standards by which work performance is measured.

The first step in financial planning, as previously mentioned and illustrated, is to chart the financial requirements to accomplish the schedule and supply the manpower, facilities and material. The second step is to prepare a detailed breakdown of funds to be allocated, by control elements. The breakdown must be correlated with the established estimates and pricing information used in preparing the final sales proposals. Funds are then allocated per this breakdown by inclusion on the work authorizations as they are issued. These two steps are necessary to facilitate adequate cost gathering and reporting. Exhibit 5 shows the details of typical fund allocation and appropriation.

Cost Gathering and Reporting

The establishment of planning schedules, manpower forecasts, facilities requirements, material needs and financial projections, as well as work authorization procedures, merely provides the means of control. Granted, these might assure that a uniform approach is maintained and that no projects are initiated without adequate planning, but no provision has yet been made for control of the execution phase of programs. The controller's function of providing the means of handling data for the necessary feed-back of progress and status reporting is the next step. Needless to say, this literally encompasses the entire accounting function of the company and involves many areas which are not pertinent to our disccussion here. There are several basic requirements, however, which must be considered, i.e., the reporting should:

— gather the information in the same structural elements as the organization structure of the company,

— move upward through the decision points of the organization structure,

— conform to the same control elements established by program plans and work authorizations,

— show both the physical completion status as well as current budget positions,

— be simple but in sufficient detail to promote action on the part of responsible individuals.

Accounting reports, where multiple contracts are involved, may be staggered throughout the month. Little does it matter whether reports are prepared on

the first or the twenty-first, as long as the periods covered are uniform and the ingredients included are comparable. The controller's primary concern, once the reporting formats and procedures have been determined, is, of course, the timeliness of the reports. Depending upon the complexity of the contractual requirements, such reporting should never be made more than seven days subsequent to the fact, if it is to be effective.

Typical Reports

A typical project status report is shown in Exhibit 6. This report covers the major and minor work elements of the contract in cost code order and shows the source of cost charges, total labor hours to date, straight-time labor costs, overtime premium cost and expense expenditures to date. Accounts payable charges, representing principally outside services, are shown separately from material charges which have entered inventories. The "total expended" figures represent total material and direct labor charges to date. To this are added the outstanding commitments to arrive at the total costs for the contract to date. The authorized funds for each control or responsibility point are shown and the balance remaining to be expended is extended in the last column.

This report is used by operating management as a basis for preparing summary reports to company management by major work elements of the contract. These summaries contain additional information in the form of physical completion percentages and estimates of hours and dollars to complete. The summary reports may be grouped by contracts, projects within contracts or by specific organizational section, as circumstances dictate.

Need for Adequate Coding

Coding for data and data handling methods must be standardized as much as possible within the limitations imposed by the need for flexibility. This is vital if reports are to be standard and consistent in format for comparative purposes and to permit timely reporting. Proper coding is necessary to facilitate the gathering and accumulation of accounting data in required form. Code construction for a sizable and complex contract or project is a complicated task, the development of which requires full awareness of the interdependence of the factors of a particular contractual problem. It must be preceded by the planning and definitive steps discussed previously so as to furnish the controller's function with a full appraisal of the job to be done. Contractual elements to be controlled, performance checks desired and points of assigned responsibility must be known.

PROJECT STATUS REPORT

TOTAL LEVELS 5 4 3 2 1							LABOR				ACCOUNTS PAYABLE	MATERIAL	TOTAL EXPENDED	OUTSTANDING COMMITMENTS	COSTS TO DATE	COST ALLOCATION				BALANCE
ACTIVITY	ACCOUNT DETAIL			PERFORMING SOURCE			HOURS	STRAIGHT TIME	OVERTIME PREMIUM	EXPENSE						RESP.			AMOUNT (LESS G&A)	
30	1521			AF 3201-90			FP	MXI-TRAINER	FD	57--2/58	365-01-01	$100,000								
30	365	01	01	30	04	01	120.0	700	0	1050	1000	400	3150	400	3550					
30	365	01	01	30	04	02	88.0	560	40	840	100	376	1916	316	2232					
30	365	01	01	30	04	03	798.0	5586	360	6980	3250	880	17056	4275	21331					
30	365	01	01	30	04		1006.0	6646	400	8870	4350	1656	22122	4991	27115	30			56000	24887.05
30	365	01	01	30	05	02	240.0	1400	0	2100	2000	800	6300	800	7100					
30	365	01	01	30	05	03	172.0	1020	80	1680	200	752	3752	632	4364					
30	365	01	01	30	05		412.0	2420	80	3780	2200	1552	10032	1432	11464	30			18000	6556.01
30	365	01	01	30			1418.0	9266	480	12650	6550	3208	32154	6423	58577	30			70000	31423.02
30	365	01	01	42	04	02	824.0	4840	160	7560	4400	3104	20064	2864	22928					
30	365	01	01	42	04	03	172.0	1220	100	1640	1289	1457	5686	3425	9111					
30	365	01	01	42	04		996.0	6060	260	9200	5689	4541	25750	6289	52039	30			30000	<2039-01>
30	365	01	01	42			996.0	6060	260	9200	5689	4541	25750	6289	52039	30			30000	<2039-02>
30	365	01	01				2414.0	15326	740	21850	12239	7749	57904	12712	70616	30			100000	29384.05
30	365	01					2414.0	15326	740	21850	12239	7749	57904	12712	70616	30			100000	29384.04
30	1521			AF 3201-90			FP	MXI-TRAINER	FD	57--2/58	365-02-01	$ 80,000								
30	365	02	01	30	05	03	23.0	46	0	50	429	132	637	35	670					
30	365	02	01	30	05	04	4.1	21		5	62	56	144							
30	365	02	01	30	05		27.1	67	0	35	491	188								
30	365	02	01	30	06	02	90.0	270	19	117										
30	365	02	01	30	06		90.0	270	19											
30	365	02	01	30																

EXHIBIT 6

Selection of the proper accounting codes involves not only coding for identification purposes but also allowing for the mechanical or electronic data handling operations which precede the preparation of the desired reports. The digital construction of the codes must go hand in hand with the purposes such codes will serve. To illustrate a typical contract code structure serving the accounting requirements and operating controls, we shall use an eight-digit code number. Such a code number includes the general ledger account number, the contract identification number (project number) and a four-digit account analysis number. The first two digits of the account analysis number are used to identify a major item or segment of work and the last two digits identify a minor item or segment. (Part number would be used in addition to such a code as a means of further breakdown, if required). A code number constructed in this manner would look like this when illustrated:

1234—567—89—12

(123)4— General ledger work in process account
(Last digit only of general ledger account used in code)
—567 — Contract or project number
— 89 — Major item or segment of work
— 12 — Minor item or segment of work

Importance of Ingredients

No system in itself will control any program or business operation. The success of a system depends upon the vision and abilities of a company to establish and meet definite objectives through the three legs of our management tripod which requires it to organize effectively, plan adequately and control performance. The success of any contract will depend upon management's ability to maintain the proper balance among these three factors. Too much emphasis on any one factor can be as detrimental as the complete omission of a factor. Given proper balance, a well-developed system can operate effectively.

Objectives and Methods of Research in Management Accounting

The following statement was developed by the Research Planning Committee and included in the report made by that Committee to the National Board of Directors on December 19, 1959. Since the statement may be of interest to many members of the Association, the Directors decided that it be published in the N.A.A. Bulletin.

A limited number of reprints will be available to college teachers and other persons interested in accounting research.

I. Definition of Research as Applied to Accounting

DICTIONARIES DEFINE research as a consciously directed attempt to expand knowledge and understanding as opposed to accidental discoveries or the unquestioning acceptance of what exists. These definitions usually include phrases describing the processes by which research is carried on. Examples of such phrases are: "studious inquiry", "systematic investigation and analysis" and "classification of observations to bring out relationships."

Basic vs. Applied Research

Distinctions are often drawn between "basic" or "fundamental" research and "applied" research. Following are typical definitions of these terms.*

> *Basic research:* "Any planned search for unknown facts and principles of general validity with or without specific regard to immediate or future utility."
>
> *Applied research:* "Any planned investigation with the intent of utilizing known phenomena or substances to accomplish a given practical objective."

The foregoing definitions of basic and applied research are, of course, stated from the standpoint of research in scientific fields. When applied to the subject matter of accounting, it is suggested that these definitions may be restated as follows:

1. Basic research in accounting consists of identifying the purposes for which accounting may be used and defining the concepts of income, cost, and value which are relevant to each purpose.

* W. I. McNeill, *Proceedings of the Fifth Annual Conference on Industrial Research*, Columbia University, 1955, p. 236.

2. Applied research in accounting consists of finding or devising practical methods or procedures for developing the types of data needed for a given purpose.

II. What Research in Accounting Can Accomplish

The accomplishments of research in the natural sciences are well known and there seems to be no reason why accounting knowledge cannot also be expanded by research. At the same time, accounting differs from chemistry or physics and these differences have important implications for the research worker in accounting.

The research worker in natural science can study the behavior of natural phenomena such as gravitation or photosynthesis without concerning himself with the purposes these things are intended to serve because they are not man-made and exist apart from human actions. On the other hand, accounting is a man-made art, designed to aid men in achieving certain aims. It does not exist apart from human purposes and does not make sense unless viewed in the light of the ends to be served. Orderly relationships are already present in the subject matter with which the natural sciences deal. These relationships can be discovered and used to manipulate materials for our purposes, but we cannot alter the relationships we find in nature. Orderly relationships in accounting exist only because they were deliberately planned; the lack of such order in some areas of accounting reflects inadequacy of the planning. These areas also offer a challenge and opportunity to the research worker in accounting.

Objectives of Research in Accounting

A program of research should be based on examination of the possible objectives to decide what the research aims to accomplish and what form the results should take. A clear understanding of objectives gives direction to research and improves the likelihood of a useful outcome. It may also enable the research worker to avoid blind alleys before time and effort are wasted.

Research in accounting can accomplish the three things which are briefly stated below and discussed under the headings which follow:

1. It can ascertain what needs and uses there are for financial data of types that can be supplied by the accountant. This establishes the purposes that accounting is intended to serve.
2. It can formulate and define concepts of cost, income, and value which are relevant to each of the uses identified in (1) above.
3. It can find or devise techniques, methods, and procedures which conform to given concepts.

Purposes—The Starting Point of Research in Accounting

Because accounting exists to serve practical purposes, research in accounting needs to begin by considering the purposes for which the accountant's reports are to be used. When these purposes have been clearly defined, the research worker is in a position to study means for achieving these purposes.

Many of the controversies which have filled accounting literature over the years have not represented disagreement on fundamental issues. Instead, the participants in these controversies had in mind different purposes which called for different concepts and procedures. When this was recognized, the arguments were resolved.

To illustrate, pricing policy ranges from the setting of long-range goal figures calculated to yield a desired rate of return on investment to short-run situations in which pricing is a matter of trying to recover something toward sunk costs which would otherwise be lost. In between these extremes there are needs for various kinds of both cost and income data to guide management in pricing to meet competition, to obtain an adequate volume, to secure the optimum sales mix, etc. Oversimplification in stating uses for accounting data is likely to cause the accountant to fall short of his target in supplying the kind of data which will have maximum usefulness.

In addition to the more familiar areas in which accounting is well established, it seems reasonable to expect that there are other areas of potential service. It may be possible to discover such areas by study to ascertain what the problems are which face management at all levels in a company organization. From the knowledge so gained, new ways to use accounting data and the accountant's analytical skills may be discovered. In practice, the accountant's willingness to broaden the scope of his services is responsible for his rise from the status of a skilled clerk to a member of the management team.

New developments in management often raise new problems for the accountant and offer opportunities for research. For example, the trend toward decentralization of management led to the N.A.A. study of intra-company transfer pricing. Likewise, the appearance of new data processing machines created the demand for a study of classification and coding techniques. This alertness to new ideas in management can be expected to suggest new topics for research.

Accounting Concepts — Building Blocks for Clear Thinking

The basic elements of accounting are concepts identified by terms such as asset, liability, cost, and income. These concepts are abstract ideas, but they must have specific meaning to be useful. To illustrate, before techniques can be developed

for measuring income, it is necessary to have a clearly defined concept of what is to be measured. Much confusion can be traced to the use of accounting concepts which are not sharply defined.

Clear definition is possible only in terms of a purpose because, again, accounting does not exist apart from the purpose for which it is designed. While a physicist forms his concept of an atom by observing its properties, an asset has only those properties which have deliberately been given to it by the accountant when he defined it. An accounting concept can be expected to have stability and acceptance only when it is the most useful idea for its intended purpose. Attempts to sharpen definitions of accounting concepts usually reveal that many terms in common use include a whole complex of ideas arising out of the different purposes for which terms like income or cost are used.

The fact that accounting concepts are related to purposes for which accounting data are used furnishes the starting point in defining concepts needed in both research and practice. Definition proceeds by selecting from the many ideas associated with a broad term like cost those ideas which are relevant to a given purpose and excluding those which are irrelevant.

For example, if the purpose is to control current costs, some of the relevant and irrelevant characteristics associated with the term cost are:

Relevant to the purpose of cost control:

a. That they are costs which a given individual has authority to incur and is responsible for.

b. That they represent what he should spend or has spent for a specified purpose.

Irrelevant to the purpose of cost control:

a. That the costs are (or are not) includible in inventory cost.

b. That the costs are assigned to products as direct (or allocated) charges.

The research worker can contribute much toward clearer thinking in accounting by careful formulation and definition of concepts and by relating these concepts to the purposes to which they are relevant. In this process he should be guided by practice insofar as practice exists which is free from confusion.

Methods and Procedures to Implement Concepts

Concepts must be implemented with methods and procedures. In other words, when the kind of cost figure relevant to a purpose has been defined, practical

methods are needed to measure the data and to record and report the results of the measurement.

There are practically always alternative accounting procedures for accomplishing the same objective. Different methods may give the same end result, but often with varying degrees of precision. Selection of the method to be used requires practical compromises in which time and expense to produce data are balanced against precision and completeness. Methods and procedures may be distinguished from concepts in that there is only one concept relevant to a given purpose, but there are often numerous methods for measuring the data defined by the concept.

Where alternative methods and procedures are available for the same purpose, and where governmental regulations or the public interest is involved or company policy dictates, it may be desirable to specify the practice or practices which are to be considered acceptable or standard. Such standard accounting practices are established by company managements, by governmental agencies, or by other bodies which possess authority to prescribe what practice should be. As circumstances change, standards need to be changed too. The method which is standard today may be obsolete under tomorrow's changed conditions.

III. Presenting the Findings from Research in Accounting

The findings from research in accounting may be presented by (1) describing in detail the various practices and ideas found in use, (2) by formulating generalizations which describe the practices and ideas in use, or (3) by combining the two. Most N.A.A. research reports have contained generalizations supported by descriptions of practice which illustrates the generalizations.

Formulating Generalizations

In the course of a research study such as those which have been carried on by N.A.A., a sizeable body of practice is obtained and reviewed and numerous ideas are tested. From the mass of detail, generalizations can be drawn to bring out the significance of the material. These generalizations also serve to convey to others the knowledge gained by research without requiring them to repeat the entire study.

Such generalizations express important relationships among accounting ideas. Fully expressed, they consist of three parts, namely:

1. A statement of the purpose for which accounting is being applied.

2. An assertion as to what is true.
3. Reasons explaining why the foregoing statement is true.

An example of a generalization which follows the pattern described above is given below.

Purpose: The control of costs.

Statement: Requires classification of costs by managerial responsibilities for control.

Reason: Because actions to control costs must be taken at the place and time where costs originate; i.e., within the areas of authority where the decision to incur or not to incur a cost is made.

(From the *Analysis of Manufacturing Cost Variances,* N.A.A. Research Series No. 22.)

Generalizations on accounting practice may be derived in two ways:

1. By inductive reasoning from the study of practice. Such generalizations state what has been found to be effective practice for a purpose.
2. By deductive reasoning from pre-established premises. The deductive approach enables research workers to make logical statements about what practice ought to be even though no practice is available for study.

When the inductive method is used, systematic and scholarly examination of experience represented by practice is essential to make sure that the conclusion is a valid one in the sense that it is actually supported by factual evidence. Deductive methods of reasoning do not eliminate the need for study of practice because such study is essential to make sure that the reasoning begins with premises on which useful conclusions can be based.

As defined above, generalizations on accounting practice do not imply any authoritative endorsement or pronouncement. Instead, they rest solely upon reasoning and experience. If the statements advanced constitute useful generalizations, it may be expected that they will receive acceptance on their merits.

Reporting Accounting Practice

As products of research, generalizations on accounting practice should be accompanied by full disclosure of the evidence on which they are based and of the processes of reasoning by which they are derived. The reader is thereby enabled to judge for himself as to whether the facts have been correctly interpreted and conclusions correctly drawn. When the supporting evidence is not

disclosed, statements are merely unsubstantiated opinions rather than conclusions from research. For this reason, a report presenting findings from research should always contain descriptions of practices reviewed in the study.

The usefulness of a research report is also enhanced by presenting practical methods for applying the accounting practices and concepts described. Examples of effective methods and procedures assist others to apply ideas developed by research. In a practical art such as accounting, the only objective of knowledge is action, and research should, wherever possible, be carried to the point where the implied action can be visualized. Descriptions of practice have the additional advantage in that they often constitute an effective educational tool because most people think in concrete rather than in abstract terms.

Cost or Profit Accounting?

by FRED SCHNEIDER*

IF WE EXTEND the operations research and business systems concept into the cost accounting and cost determination sphere of management work, we have to consider the objective of maximizing profits rather than just highlighting variances. It is clear that we can incur variances from standard cost which may look severe if examined without the necessary background information. However, if we decide that these variances are incurred in an attempt to maximize profit, then, depending on the situation that has arisen at that time, such variances may be justified. For instance, because the products or styles which have occasioned these variances have actually helped us to increase profits, it may be better for the all around profit picture to incur them sometimes—rather than not to have taken the steps from which the variances resulted. Hence, the marginal profit of this operation has been increased.

Also, the most profitable program is not necessarily the one that uses the cheapest method. The most profitable program is the one that gives us the greatest return. Variations in our budget and in our profit and loss statements should, therefore, be considered unfavorable only if they are due to an act which reduces profit, rather than just increases cost. Without this increase in cost we may not have been able to get any contribution to profit; hence, the marginal income which is the actual measure of the profitability of an enterprise may have been decreased. This, of course, does not apply only to alternate processes but also to substitute materials and other methods which may have been chosen in order to provide the proper products. The only way to evaluate such decisions as are discussed here is to reconstruct the situation as it existed at the time of decision-making and then, on the basis of a "dry run", determine what the effect of the alternate decision would have been.

The consequence of such an approach may be far-reaching, because it will lead to the concept of profit accounting rather than cost accounting. All levels of executive decisions will then be evaluated on the basis of profit realized, rather than cost incurred.

While this concept may appear different from routine, it is one that operating management has in some form or other utilized all along. Often when a machine breaks down, we may use any method, regardless of cost, to get it back in operation again. The object is to minimize loss of down time. If we relate or expand this thought to revenue obtained from production which could not otherwise be sold, the above approach becomes identical with the concept previously outlined. This approach also embodies the philosophy of considering the business system as a whole rather than each department or phase separately.

The conclusion of this discussion is a challenge. Let us who determine costs and try to safe-guard the profitability of the enterprise go out and guide it to maximum profit, even at the cost of stopping the traditional reports on variances. Instead, let us go out and do operations research.

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Management Accounting Problems in Foreign Operations

Presented below is a digest of findings in the N.A.A. research study dealing with management accounting problems in foreign operations. Members of the Association who wish a copy of the full report may obtain one copy without charge by returning the postage-paid order card which will be mailed to them in a few days. Copies of the report are also available to non-members at $2.50 each. Members may obtain additional copies at the same price. Quantity discounts apply to orders in excess of four copies.

IN THE SEARCH for profitable opportunities to employ capital and know-how, many U. S. companies have recently extended their operations beyond the boundaries of the United States. However, foreign operations raise financial management problems which are often unfamiliar to management which has gained its experience in domestic operations. The accountant carries responsibility for maintaining accounts, for reporting results of foreign operations, and for assisting other members of the management team to understand financial reports relating to foreign operations. This N.A.A. study was initiated to explore these problems and to ascertain how they are approached by companies with experience in foreign operations.

A preliminary survey of the subject showed that the unique accounting problems in foreign operations arise in accounting for transactions in different currencies where stable relationships between these currencies are lacking. The value of many foreign currencies, expressed in terms of the U. S. dollar, has declined and, notwithstanding the fact that foreign subsidiaries may show profits in local currency, these profits undergo shrinkage on translation to U. S. dollars. However, management can often take action to avoid or to minimize losses from currency depreciation. This study shows that the accountant has an important function to perform by informing management of the circumstances and by suggesting courses of action.

In order that effective and timely decisions can be made, management, both in the United States and abroad, needs to know what assets are at risk, how they may be affected by currency fluctuation, and what possible measures exist

for protecting the company's interests. In reporting, local currency financial statements need to be translated into dollars for the following important reasons. (In the study the term "translate" is used to describe the act of preparing U. S. dollar statements on the basis of local currency amounts while the term "convert" is applied only to the actual exchange of foreign currency for U. S. dollars.)

1. Operations of foreign subsidiaries must be expressed in dollars to evaluate the return produced by the U. S. parent's dollar investments.
2. Management in the United States is accustomed to thinking in terms of dollars rather than in foreign currencies.
3. Translation of local currency to dollars is necessary to determine the periodic loss or gain sustained by the U. S. parent company from movements in exchange rates. This figure measures the degree of success which management has had in protecting the U. S. parent company's dollar investment against erosion from currency depreciation.
4. Consolidation requires that financial statements be expressed in homogeneous units.

Translating Local Currency Accounts to U. S. Dollars

To supply background for the study, analysis is first employed to show how assets and liabilities are affected by exchange rate movements. The analysis emphasizes the fact that during recent years the dollar value of many foreign currencies has declined drastically. This process has often been accompanied by official devaluations, restrictions on convertibility of currencies, and the use of preference or penalty exchange rates. On the other hand, foreign exchange accounting procedures commonly presented in textbooks were designed to operate under conditions where exchange fluctuated within a narrow range and currencies could be freely bought and sold.

From the standpoint of the U. S. shareholder, two classes of items may be distinguished in the balance sheet of a foreign subsidiary. First, there are *financial items* consisting of local currency and claims to receive or to pay a fixed number of local currency units. The dollar equivalent of local currency financial assets and liabilities is immediately affected by a change in the rate of exchange. The reason is that if the local currency declines relative to the U. S. dollar, financial assets in local currency will yield fewer dollars on conversion and debts payable in local currency can be satisfied with fewer dollars. Local currency financial assets are always at risk from unfavorable movements in the

exchange rate. This risk can be minimized by keeping net financial assets of the foreign subsidiary as low as possible. Because financial items are immediately and directly affected by fluctuations in exchange rates, the exchange rate prevailing on the date of the balance sheet yields the best translation for financial items expressed in a foreign currency.

The *physical assets* constitute the second class of items in the balance sheet of a foreign subsidiary. Physical items such as inventories and fixed assets tend to be unaffected by exchange rate fluctuations. Since a substantial decline in value of a foreign currency unit relative to the dollar is usually a consequence of inflation in the foreign country, prices in that country may be expected to rise and physical assets will command increased selling prices in the devalued currency. Such assets are logically translated at the rate of exchange current on the date the foreign subsidiary acquired the assets.

This classification of local currency balance sheet items into financial and physical items for the purpose of translation differs from the conventional practice of translating current items at the current rate of exchange and fixed assets and long-term debt at historical rates of exchange. However, the study points that long-term receivables and long-term debt are affected like current financial items by permanent changes in the dollar value of the local currency. Similarly it may be expected that, in the long-run, management will not continue to sell goods in a foreign country unless the local currency equivalent of dollar cost can be obtained. For this reason inventories are not viewed as a source of exchange loss.

Unlike assets and liabilities, the question of how to translate net worth items cannot be answered directly by observing the effect which exchange rate fluctuations have on these items. In order to preserve the amount of the original dollar investment in the subsidiary, capital stock is translated at historical exchange rates. Retained earnings are made up of annual earnings as translated in each of the years of accumulation less excess of foreign exchange losses over gains to the date of the current balance sheet.

Revenues and expenses arise day by day and local currency profits could be measured in dollars by translation at exchange rates prevailing when each transaction occurred. However, this is impractical where there are many transactions and average exchange rates are used for translation of income statement accounts other than depreciation, depletion, and amortization expense. Here the problem is to construct an average which represents exchange rates prevailing during the period. The report describes and illustrates methods for deriving average rates which can represent various patterns of fluctuation in actual exchange rates.

The distinction between realized and unrealized foreign exchange loss or gain is discussed from the viewpoints of local taxation, internal evaluation of management performance, and external reporting to U. S. shareholders.

Reporting to Management on Foreign Operations

The final chapter of the report states that some of the major financial problems in foreign operations have their roots in currency fluctuation. In many cases management can take action to avoid losses if it is informed and knows how to proceed. However, in order to protect a company's foreign investment against loss from currency depreciation, management must understand how exchange rate fluctuations affect the various types of assets and liabilities. Meaningful translation procedures can go far to foster this understanding. Unless loss or gain on foreign exchange can be analyzed to explain how it arose, it serves merely to effect a mechanical balance in the dollar statements.

The report concludes with a brief discussion of actions which can be taken to minimize losses of foreign exchange. These actions are grouped into two categories.

1. Long range planning to minimize exposure to risk by actions such as raising capital locally, manufacturing abroad to avoid importing materials which must be paid for in dollars, and education of local management to understand currency fluctuation.
2. Protective responses to imminent danger such as withdrawal of cash, hedging risks by forward purchases of exchange or local borrowing, increases in selling prices, and conversion of cash into physical goods.

Most of the companies participating in the study emphasized the point that local management in the foreign country carries first line responsibility for avoiding exchange loss. For this reason, budgets and periodic financial statements are usually translated to U. S. dollars in the foreign countries where they originate. In this way, local management is the first to see what effect shifting exchange rates have on profits measured in dollars.

Know Your Government Contracts

by RAYMOND B. JORDAN

THE INFLUX of more and more defense spending into the American economic scene has introduced many new contractors who are experiencing Government contract negotiation for the first time. The purpose of this article is to present a thumb-nail sketch of the characteristics of the various contract types which are available to the contractor under the requirements of the Armed Services Procurement Regulation. Basically, it is the expressed intent of the Government that all services and supplies be procured under terms of a firm-fixed-price type of contract unless some other form of contract is more appropriate. The type of contract to be finalized is subject to negotiation between the two parties. The final contract, however, must contain adequate explanation of the reasons therefor whenever a contract of other than firm-fixed type is negotiated.

Determination of the type of contract to be utilized is governed by the following considerations:

1. Type and complexity of the item or service to be supplied.
2. Urgency of the requirement.
3. The period of contract performance and length of the production run.
4. Degree of competition present.
5. Presence of difficulty in estimating performance costs due to such factors as the lack of firm specifications, production experience or the instability of design.
6. Availability of comparative price data or lack of firm market prices or wage levels.
7. Prior experience with the contractor.
8. Extent and nature of subcontracting contemplated.
9. Assumption of business risk.
10. Technical capability and financial responsibility of the contractor.
11. Administrative costs of both parties.

A fixed-price type of contract normally should not be used in research and development contracts unless (1) the work to be performed can be described

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with a reasonable degree of definiteness, (2) sufficient pricing information is available to assure that the contract price will be fair and reasonable, (3) a definite period or performance can be specified and (4) successful performance of the contract is not dependent upon a break-through in the state of the art.

There are two principal types of contracts, as follows:

Cost-reimbursement Contracts:	*Fixed-price Contracts:*
Cost contract	Firm-fixed price
Cost-sharing	Fixed price with escalation
Cost-plus-fixed fee	Fixed price calling for redetermination of price
Cost-plus-incentive fee	Fixed price incentive

Cost-Reimbursement Type Contracts

The cost-reimbursement type contract provides for payment to the contractor for allowable costs incurred in the performance of the contract to the extent prescribed in it. This type of contract establishes an estimate of total cost for the purpose of obligation of funds and establishing a ceiling which the contractor may not exceed, except at his own risk, without prior approval or subsequent ratification of the contracting officer.

Cost-reimbursement type contracts are suitable for use when the nature and complexity of the procurement is such that costs of performance cannot be estimated with reasonable accuracy. In addition, it is essential that the contractor's cost system be adequate for the determination of costs applicable to the contract and that appropriate surveillance by government personnel during performance gives reasonable assurance that inefficient or wasteful methods are not being used. Substantial amounts are usually involved, but contracts less than $25,000 may be entered into upon the authority of the contracting officer.

A cost contract is a type of cost reimbursement contract in which the contractor receives no fee. This type of contract is used principally for research and development contracts, particularly with non-profit institutions or non-profit educational institutions. It is also used for facilities contracts and for initial small quantity procurements of new items with anticipated large production runs.

The cost-sharing contract is a cost reimbursement type contract in which, likewise, the contractor receives no fee and also receives only an agreed upon portion of allowable incurred costs. This type of contract is used in connection with research projects sponsored jointly by the Government and the contractor with benefit to the contractor in lieu of full monetary reimbursement of costs.

Cost-plus-fixed-fee contract. This type of cost-reimbursement contract calls for the payment of a fixed fee to the contractor. The fee, once negotiated, does not vary with cost experience but may be adjusted as a result of any subsequent changes in the work or services to be performed under the contract, the cost-plus-fixed-fee contract is used principally for research and development the scope and nature of which cannot be definitely specified. Other occasions for the use of this type of contract are as follows:

1. Definite specifications exist but the contractor lacks a valid basis for estimating costs because the supplies called for are not items regularly manufactured or the services called for have not been previously performed or partial experience will not reveal a proper pricing level for the remainder of production.
2. Production or construction contracts the specifications of which are not complete or major changes substantially affecting the scope of the work are expected.
3. Work is to be performed in a government-owned plant with the use of government-owned facilities.

The cost-plus-incentive-fee type of contract provides for a fee which is adjusted by a formula, in accordance with the relationship which total allowable costs bear to target costs. Initially negotiated are a target cost, a target fee, a minimum and a maximum fee and a fee adjustment formula. After performance of the contract, the fee payable to the contractor is determined in accordance with the formula, which provides, within limits, for increases in fee above target, when allowable costs are less than target costs, and decreases in fee when total allowable costs exceed target cost.

This type of contract is used where a cost reimbursement type contract is found necessary and where there is a probability that its use will result in lower costs to the Government than other forms of cost-reimbursement type contracts, through cost reduction incentive to the contractor. The contract is quite similar to the fixed-price incentive form of contract which will be discussed later.

Payments to Contractors under Cost-Reimbursement Contracts

From a contractor's point of view, the cost-reimbursement type of contract is attractive because of the limited investment required. At one time, it was permissible to bill all expenditures at the time they were incurred. The opposite to this type is the fixed-price type of contract in which payment to the contractor is not made until shipment of the completed article. However, it is the policy of the Department of Defense at the present time to require that contractors having cost-reimbursement type contracts maintain reasonable in-

vestment in the supplies and facilities acquired and in the services rendered during the performance of these contracts.

In keeping with this policy, cost-reimbursement type contracts provide for interim payment not to exceed 80 percent of the costs incurred by the contractor in the performance of the contract. The policy does not apply to contracts

—under which the contractor receives no fee or profit,
—with educational institutions or non-profit organizations,
—solely for the operation of government-owned plants or vessels,
—with small business concerns,
—for research and development, which do not call for quantity production,
—for performance outside the United States, its territories, its possessions and Puerto Rico,
—having an estimated cost not to exceed $250,000,
—for construction and architect-engineer services,
—for specific, technical or engineering services, including systems design and testing and evaluation services,
—calling for maintenance, repair and overhaul services in which the normal or anticipated time between the furnishing of items by the Government to the contractors for performance of the services and delivery of the items to the Government is less than three months,
—when in the judgment of the secretary of the department concerned, undue hardship would result.

Fixed Price Contracts

Fixed price contracts are established in various forms and in accordance with the basic rule that either the contractor has an adequate cost accounting system or the design of the product is reasonably well-known.

The firm-fixed-price type of contract calls for the setting of prices which are not subject to any adjustment by reason of the cost experience of the contractor in the performance of the contract. It places the greatest risk upon the contractor but, at the same time, affords him the greatest incentive for efficient performance with the resulting benefits in earnings. It has the major advantage of being the easiest to administer.

The firm-fixed-price type of contract is particularly suited to standard commercial items, modified commercial items or military items for which adequate information on production and cost is available. In particular this type of contract is suitable for use when stable and reasonably definite specifications are available and when fair and reasonable pricing can be achieved. Examples are situations in which (1) adequate competition has made initial quotations effective, (2) prior purchases of the same or similar supplies or services provide reasonable price comparisons, (3) experienced cost information or sound esti-

mates of the probable cost of the performance are available in the negotiation of contract prices and (4) any other basis for proper pricing can be utilized consistently with the purpose of this type of contract.

The fixed-price contract with escalation provides for upward and downward revision of price upon the occurrence of certain contingencies which are specifically defined in the contract. Contingencies should be limited to those beyond normal control of the contractor. The risk of the contrator is reduced by the inclusion of escalation provisions in which the Government agrees to revise the price upon the happening of the prescribed contingencies. Upward adjustment is limited by establishment of a reasonable ceiling. There is no downward limit.

There are two types of escalation clauses:

1. Price escalation clause which provides for adjustment of the contract price on the basis of increases or decreases from an agreed-upon level in published or established prices of specific items or in price levels of the contract end items.
2. Labor or material escalation clause which provides for adjustment of the price, based upon increases or decreases from agreed-upon standards or indices for wage rates, specific material costs or both.

This form of contract is appropriate when serious doubt exists as to the stability of the market and labor conditions during an extended period of production and when contingencies, which would otherwise be allowed for in a firm-fixed-price contract, are identifiable and can be covered separately by escalation. This form of contract should not be used to provide to the contractor protection necessitated by lack of adequate cost information.

Fixed price calling for redetermination of price. This form of contract provides for subsequent negotiated adjustment, in whole or in part, of the initially negotiated base price. Consistent with the particular form of redetermination clause selected, the contract price is adjusted upward or downward at times prescribed in the contract or at the demand of either party, during or after the period of contract performance. The adjusted price may be prospective, retroactive or both. There are five types of redetermination clauses:

1. Prospective periodic price redetermination at stated intervals.
2. Prospective price redetermination on request.
3. Retroactive and prospective price redetermination at a stated time prior to completion.
4. Retroactive and prospective price redetermination including a further prospective redetermination upon request.
5. Retroactive price redetermination after completion of contract.

An upward revision ceiling may be included in each of the above clauses.

The fixed-price-incentive form of contract is a fixed-price type with provision for adjustment of total target profit and establishment of the final contract price by a formula based upon the relationship which final negotiated total cost bears to total target cost. This form of contract is a reasonable compromise between the high risk of firm fixed price and the "low risk, low profit" of cost-reimbursement forms of contract. The fixed-price-incentive form of contract promises to be the most popular form of contract in future years.

Under this form of contract, there is negotiated at the outset a target cost, a target profit, a price ceiling and a final profit and adjustment formula. The formula may also provide, within the price ceiling, for a ceiling, a floor or both on final profit. The formula should reflect the risks involved. After performance of the contract, the final cost is negotiated and the final contract price is then established in accordance with the formula. Where the final cost is less than the target cost, the formula provides for a final profit above the target profit. Conversely, where the final cost is more than the target cost, the formula provides for a profit less than target profit. Thus the formula provides for a sharing of cost savings or, within the price ceiling, the sharing of excesses, as revealed by a comparison of final cost with target cost. The increase or decrease in the actual profit included in the final price is thus designed to provide, in advance, a calculable incentive to the contractor.

There are two variations of the fixed-price-incentive form, namely, initial target and successive target. Both forms provide for the setting of an initial target cost, target profit, a price ceiling and a formula for setting the final profit. Under the successive form, however, a production point is established at which the formula will be applied. Generally, the production point will be prior to delivery or shop completion of the first item. The formula does not apply to the life of the contract but simply fixes the firm target profit for the contract. When the production point is reached, the firm target cost is then negotiated, giving consideration to experienced cost and all other pertinent factors, and the firm target profit is automatically determined in accordance with the formula which then passes out of existence.

At this point, there are two alternatives possible. First, if the remaining performance of the contract provides opportunity for application of an incentive arrangement for additional and substantial reductions in cost, a final profit and price adjustment formula may be negotiated, using the firm target profit and the firm target cost. Second, if the firm target cost plus firm target profit presents a price which is reasonable and provides normal business risks to the contractor for the performance of the contract, the price may be established as a firm fixed price.

In either of the two forms of incentive contract, a billing price will be established as an interim basis for payment. This billing price may be adjusted within the ceiling limits upon the request of either party to the contract when it becomes apparent that the final negotiated costs will be substantially different from the target costs.

Final Price Computation for Fixed-Price-Incentive Contract

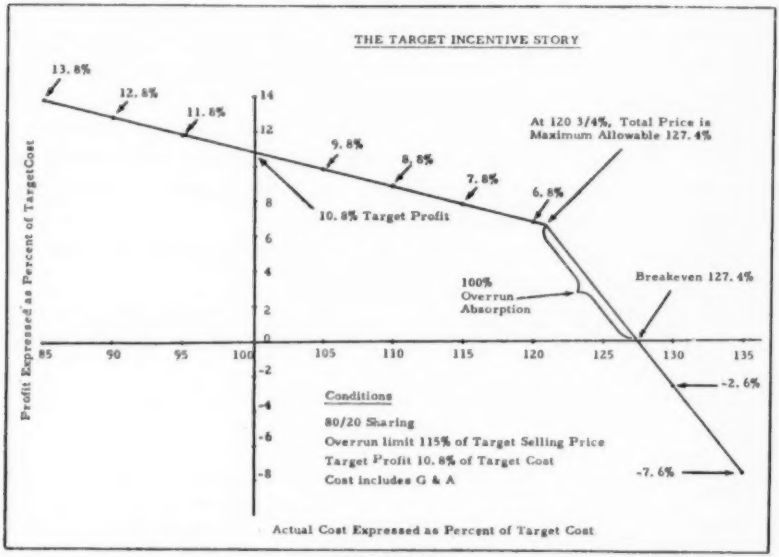

EXHIBIT 1

% of Actual Cost Over(Under) Target Cost	Resulting Profit (Loss) Ratio to Target Cost
(15)%	13.8%
(10)	12.8
(5)	11.8
0	10.8
5	9.8
10	8.8
15	7.8
20	6.8
20 3/4	6.65 (maximum sharing)
25	2.4
27.4	0 (breakeven point)
30	(2.6)
35	(7.6)

EXHIBIT 2

Let us consider a typical example of the final price computation in a fixed-price-incentive contract. In this case, the sharing agreement is on an 80/20 basis. This means that, when actual cost exceeds target cost, the Government assumes 80 percent of the excess cost, while the contractor absorbs the remaining 20 percent in the form of a reduction in profit. Conversely, when actual cost is less than target cost, the Government keeps 80 percent of the reduction and gives 20 percent of the reduction to the contractor in the form of increased profit. A ceiling is set, however, beyond which there is no sharing agreement, thus causing the contractor to absorb whole dollars. In our example, we will use a target profit of 10.8 percent of target cost and a ceiling of 115 percent of target selling price. This means that, at 120.75 percent of target cost, the sharing agreement is ended. Beyond this, the lack of sharing agreement begins to eat into the profits until the break-even point is reached at 127.4 percent of the target cost. In addition to the following examples, Exhibits 1 and 3 show what happens to profits at various actual cost points.

Major points from Exhibit 1 where profit (or loss) is shown as a ratio to target cost are shown on Exhibit 2.

Exhibit 3 shows the profit (or loss) under varying conditions of over-run or under-run expressed as a ratio to actual cost. This is the real payoff in target incentive pricing.

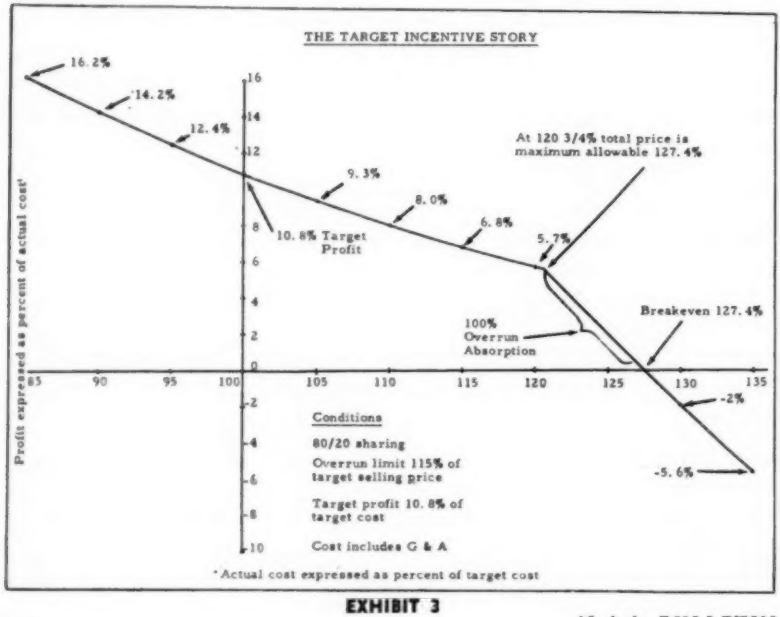

EXHIBIT 3

Actual Cost	Target Profit	Bonus (Penalty)	Net Profit	Profit Ratio To Actual Cost
85	10.8	3.0	13.8	16.2%
90	10.8	2.0	12.8	14.2
95	10.8	1.0	11.8	12.4
100	10.8	-	10.8	10.8
105	10.8	(1.0)	9.8	9.3
110	10.8	(2.0)	8.8	8.0
115	10.8	(3.0)	7.8	6.8
120	10.8	(4.0)	6.8	5.7
120.75-a)	10.8	(4.15)	6.65	5.51
125	10.8	(8.4)	2.4	1.9
127.4-b)	10.8	(10.8)	0	0
130	10.8	(13.4)	(2.6)	(2.0)
135	10.8	18.4	(7.6)	(5.6)

(-a Point beyond which we lose "whole" dollars (no sharing)
(-b Maximum the Military can pay under 80/20 sharing agreement.

EXHIBIT 4

Important points from Exhibit 3, using target cost of 100.0 and target profit of 10.8, are shown on Exhibit 4. Let us look at the examples derived from this situation shown on Exhibits 5 and 6.

	The Target	Actual	
Target cost	$100,000	Cost	$115,000
Target profit	10,800		
Target price	$110,800		
Computing the results, we get:		Recomputing the final price to reflect the penalty as a reduction of profit, we get:	
Actual cost	$115,000	Actual cost	$115,000
plus		Profit	7,800
Target profit	10,800	Final price	$122,800
less			
Penalty	(3,000)	Profit %	6.8% (Ratio to cost)
Final price	$122,800		

(20% of excess of actual cost over target)

EXHIBIT 5

The Target		Actual	
Target cost	$100,000	Cost	$ 90,000
Target profit	10,800		
Target price	$110,800		

Computing the results, we get:

Actual cost	$ 90,000
plus	
Target profit	$ 10,800
plus	
Bonus	$ 2,000
Final price	$102,000

(20% of excess of target cost over actual)

Recomputing the final price to reflect the bonus as an increase in profits, we get:

Actual cost	$ 90,000
Profit	12,800
Final price	$102,800
Profit 14.2%	(Ratio to cost)

EXHIBIT 6

The Target	
Target cost	$100,000
Target profit	10,800
Target price	$110,800
Actual	
Cost	$130,000

Computing the results, we get:

Actual cost	$130,000	
plus		
Target profit	10,800	
less		
Penalty #1	(4,150)	(Maximum sharing)
less		
Penalty #2	(9,250)	(Whole dollar loss)
Final price	$127,400	(Maximum allowable price)

Recomputing the final price to reflect penalties as a reduction of profit, we get:

Actual cost	$130,000
Profit	(2,600)
Final price	$127,400
Profit % (2.0%	(Ratio to cost)

EXHIBIT 7

Now let us look at what happens (Exhibit 7) when we exceed the maximum price which the military can pay (115 percent of target selling price or 127.4 percent of target cost).

Contract Negotiation Requires Knowledge of the Facts

This article has attempted to present in brief form a thumbnail sketch of the characteristics of the various types of contracts which are available to contractors in conducting business with the Government. The aggressive contract negotiator will make himself familiar with these characteristics in order to be of greater service to his company. He will also make himself familiar with the Armed Services Procurement Regulation and other publications related to government contract negotiations.

Make-or-Buy Decisions— Cost and Non-Cost Considerations

by KENNETH F. SCHUBA

EVERY BUSINESS frequently must decide whether to make or buy the things it needs. The making of such decisions generally will have profound effects on various aspects of the business. Very often the decisions are related to an evaluation of expanding productive capacity, adding new products to the line or procuring raw materials and components of existing products. Further, there is no finality to make or buy decisions. Competitive pressures, production methods and capacities, available working capital and cost of capital are changing constantly. As a result, it is necessary to evaluate past decisions in the light of experience and current conditions.

The problem of make or buy is a part of the broader discussion of enlarging business units by the processes of integration and combination. Essentially the same end is accomplished by a decision to make whether a company increases capacity of its own facilities or purchases the facilities of another concern.

Make or buy primarily is a problem in the selection of a source of supply. The objectives of procurement are the same whether the source of supply is the company or an outside vendor. These objectives are to obtain at the least cost the right materials (quality) at the right time in proper quantities (quantity).

Before We Consider Cost Evaluation . . .

In economics, cost is the only factor in making a business decision. This long-run cost concept includes tangible as well as intangible results of an action, such as effects upon labor morale or supplier goodwill. This concept is valueless in arriving at a meaningful dollar figure comparison of make or buy because of the many factors involved which cannot be measured. Nevertheless, cost in the economic sense must be considered and the term will be taken to include all intangible factors and policies which must be evaluated after tangible measurements are made.

Tangible cost is only one of the factors in determining a business decision. Applied to make or buy, it offers a starting point in analyzing by determining

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the cost to make or to buy a specific item. Intangible factors are not considered in arriving at the respective dollar amounts. The cost calculations then become part of the factors in determining acceptability of alternatives or cost in the economic sense.

The objective of obtaining the right materials, or quality, is so important in some cases as to dictate the decision to make or buy. In other cases, the variation in quality is so slight that this objective has little weight in reaching the decision. The term, quality, implies more than an unreasoned desire for the best quality, or perfection. It implies a quality desired because it is best suited to the specific purposes for which it is to be used. Further, this determination of desired quality is made only after reasoned thought. The problem of establishing a desired quality is one of engineering and sales. Make or buy is concerned only with how to attain objectives of procurement and not with the objectives themselves. As a practical matter, desired quality in most cases would allow some degree of tolerance of acceptable goods.

The exact quality specified remains unchanged as the search for source of supply continues. Usually quality specifications change only when new materials or improved manufacturing methods are discovered or when consumer demand changes.

This is not as true of quantity. Ideally, materials and supplies would be purchased and delivered just at the time they were needed by the departments using them, with no penalty for buying in small lots. In this situation, quantity becomes a matter of routine. The ideal condition is seldom reached because of the difficulty of forecasting the demand accurately. Also, suppliers and transportation companies canot be relied upon to work on exact schedules without some delays. Then, too there usually are price penalties for buying in small quantities. For these reasons, the desired quantity is not known with the same degree of accuracy as the desired quality. Instead of there being a known constant (as with quality) to be evaluated against possible ways of attainment, there is the changing factor of quantity determined by independent variables. The question of how much to buy, then, is the quantity problem in purchasing; in producing, the question is how much to produce and how much production capacity to provide.

Cost Evaluation for Make or Buy Decisions

As mentioned previously, there are both tangible and intangible considerations in the area of make or buy. Evaluation studies, such as cost comparison, can reflect only the tangible factors. The intangible factors are in the areas of

management policy. The accountant will have to consider policy but it should not influence the evaluation studies. They should be completely objective.

Cost evaluation should analyze the advantage of one course of procurement action over another only so far as cost is concerned. For this to be true, other things must be equal and must not be allowed to affect the cost figures. These "other things" are, primarily, quality and quantity, although all intangible factors comprising cost in the economic sense are included. In practice, it is often difficult if not impossible to keep these other things exactly equal in calculating cost of making and buying. For instance, delivery schedules and exact quality may not be equal if a company made or bought. It is necessary, therefore, to recognize variations in these other things which affect make-or-buy decisions and to make necessary allowances for the variations when interpreting the cost figures.

There are, of course, different cost figures for different purposes. For example, there are standard costs, actual costs and direct costs, to name a few. Further, the cost of making can be represented by extremes from labor and material to labor, material, burden and commercial expenses, using any one of several cost bases. Likewise, cost of buying might be represented by purchase price only or by purchase price, freight, receiving and handling expense, plus buying, inspection and commercial expenses. Generally, the cost to be used in make-or-buy comparisons should be actual costs, as opposed to standard costs, of all areas affected by the decision. This gives a picture of what costs are or will be rather than what they should be.

An error to be avoided in the cost calculations is usually made by computing readily evident changes, such as direct material and labor costs, and then applying existing rates and ratios to determine the effect on other cost areas. It should be recognized that total dollars of expense, allocations to products lines and productive operations and even capital employed may be changed by a shift from make to buy or vice versa. Both possible actions are in the future and the costs used in the calculations must refer to the future, not the past. Thus, the term, actual costs, mentioned previously, means future estimated costs including material, labor and variances directly attributable to the item under analysis.

Budget Methods of Cost Calculation

Complete budget. Broadly speaking, detailed estimates of future costs may be called budgets. Make-or-buy analysis, therefore, can be made by use of budgeting techniques, differing as necessary from techniques used in budget-

ing for cost control. The most complete method of finding the cost of two proposed actions is to make successive complete budgets of the expenses of the entire business under the conditions which will be in existence if each of the proposed actions is to be adopted. A less extensive method is desirable, however, since the clerical effort involve would be costly and action would be delayed while awaiting completion of the calculations.

Restricted budgets can be used as a modification of complete budgets. Under this method all expenses for only the areas directly affected by the make-or-buy decisions are estimated. The area included may be a department, a product line, a small segment of a machine group or an entire operating division, depending upon the individual situation. The important point is that all expenses, including commercial expenses, affected by the alternatives must be considered.

The increment cost method, second modification of the complete budget, limits the items of cost to be included in the analysis instead of limiting the area covered by the budget. Generally, costs which are not changed, even in the area affected by make or buy, are not considered in this method. The reason, of course, is that costs which remain unchanged would appear in equal value in both budgets. Costs remaining unchanged are those referred to as fixed. These costs would have to be identified beforehand so that their exclusion from the analysis would be automatic. Otherwise, all costs, variable and fixed alike, would have to be analyzed in each make-or-buy alternative and the method, then, would become restricted budgeting and not incremental cost.

Applicability of the Methods

Any one of the three cost analysis methods discussed will produce satisfactory results. The complete business budget, because of the great amount of work and time involved in preparation, is recommended only for unusual and complex make-or-buy problems. An example would be a make alternative with integration with another company as the means to this end.

The restricted budget method will more likely force closer examination of applicable costs to determine their future amounts than will the increment cost method. Where a buy decision, for example, changes plant capacity by disposing of equipment previously used in manufacturing, then related depreciation, property taxes and insurance charges, which normally are fixed items, will be changed. Use of the increment cost method in this situation may fail to recognize the changes in these expenses. Further, where the decision will be

effective over a long period of time, the restricted budget method reflects more completely changes in fixed costs, since these costs do change in the long run. The increment cost method assumes that these costs remain unchanged and this assumption is valid only when the effective time period is short enough so that they probably do remain unchanged. The restricted budget method, then, is recommended where the make-or-buy decision, taken by itself, will change plant capacity, thus affecting fixed costs, or where the effective time period is sufficiently long to permit changes in fixed costs.

The increment cost method can be used advantageously where the make-or-buy decision of itself does not alter plant capacity. For instance, in a company having a seasonal product line, the company might decide to manufacture in the slack periods certain parts which normally are purchased in busy periods, thereby utilizing otherwise idle capacity. Under these conditions, fixed costs would remain unchanged since only the plant operating level varies, not permanent capacity, and the effective time period is relatively short. Cost analyses can be made under any operating level as long as permanent capacity is unchanged, by using only prime costs and variable expenses, including variable commercial expenses. Effect is given to degree of available capacity in decision-making by establishing different cost cut-off points. For example, in deciding what parts to make when capacity is taxed, the company could select those items having the widest spread between cost and purchase price. This would be done through a ranking process, with the cutoff being made at the limit of capacity. The difference in circumstances, namely operating levels, leading to further make-or-buy alternatives has no effect on previous cost calculations and acts only to establish various cut-off points as between parts which will be made and those which will be bought.

The time period for which make-or-buy cost analyses are prepared should be selected carefully and the implications of the period fully recognized. Costs may be capable of running beyond the effective time period of a make-or-buy alternative and thus have to be assigned among the years. New equipment for a make decision, for example, should be depreciated over the effective production period, if this period is less than the normal useful life of the equipment and if there will be no alternative use for the equipment.

Regardless of the method used to calculate cost differential, unit cost figures generally should be avoided. Unit figures are based on both costs and volume and thus are accurate only to the extent that many fixed costs and volume remain unchanged. All applicable costs must be considered in the analyses. Using total costs gives more assurance that all applicable costs are analyzed. Unit costs can be computed from the total costs arrived at and presented to man-

agement in this form if this offers a clearer picture of the facts. The objection, then, is not to the use of unit costs as a method of presentation but to their use as the basis of the cost analyses.

An Illustration in Cost Evaluation

Exhibit 1 illustrates the basic cost data for evaluation of component parts presently manufactured in Department 10. Consideration is given to closing

Cost Data for Make or Buy Decision

Manufacturing Cost - Department 10

	Make	Buy
Material - Parts	$ 35,000	$120,000
Other	100,000	100,000
Total	$135,000	$220,000
Labor - Parts	$ 40,000	
Other	60,000	$ 60,000
Total	$100,000	$ 60,000
Burden - Salaries	$ 30,000	$ 25,000
Indirect labor	25,000	22,000
Repairs	20,000	12,000
Power and light	12,000	7,000
Supplies	8,000	6,000
Fuel	1,000	1,000
Depreciation	20,000	17,000
Property taxes	17,000	16,000
Insurance	1,000	800
Payroll taxes and benefits	22,000	18,000
Other	9,000	5,200
Total	$165,000	$130,000
Total manufacturing cost	$400,000	$410,000

Indirect Manufacturing and Commercial Expenses

Salaries	$ 50,000	$ 45,000
Payroll tax and benefits	2,000	1,500
Other	3,000	2,500
Total	$ 55,000	$ 49,000

Allocation of Costs

	Unassigned	Parts	Other	Total
Parts made:				
Material	-	$ 35,000	$100,000	$135,000
Labor	-	40,000	60,000	100,000
Burden - variable	-	34,000	51,000	85,000
Burden - allocated fixed	-	32,000	48,000	80,000
Total	-	$141,000	$259,000	$400,000
Parts purchased:				
Material	-	$120,000	$100,000	$220,000
Labor	-	-	60,000	60,000
Burden - variable	$ 10,200	-	51,000	61,200
Burden - allocated fixed	20,800	-	48,000	68,800
Total	$ 31,000	$120,000	$259,000	$410,000
Added direct manufacturing costs if parts are purchased				$ 10,000

EXHIBIT 1

the parts-making operation and disposing of the equipment. As a result, almost all sources of expense will be lower. Payroll taxes and employee benefits are affected, not only by changes in direct labor but also by changes in salaries and indirect labor. Depreciation and insurance will be lower, since equipment is being sold. Since this is an illustration of the restricted budget method, variable costs of other departments not affected by the decision are not included. All allocated and specific fixed expenses are included to assure analysis of these items. The cost figures are for one year based on annual usage of parts at the current rate.

The study of factory expense shows a net reduction of $35,000. The parts production has absorbed, however, $66,000 of factory expense, as shown in the parts column of the cost allocation table. Upon discontinuing manufacture of parts, the $34,000 of the variable burden is eliminated. Variable expenses have increased, though, because of, say, additional handling labor and related payroll taxes and benefits. The $32,000 of fixed expense allocated to parts has been reduced to $20,800 due to disposal of machinery and the resulting decrease in depreciation, property taxes and insurance. The fixed expense conceivably could be increased if greater inventories of purchased parts had to be warehoused because of vendor delivery schedules or price policies. The buy alternative, then, results in unassigned burden of $31,000. This, of course, could be assigned to the remaining production process. If this is done, the departmental variable burden rate changes from 85 percent, if parts are made, to 102 percent of direct labor dollars if part are purchased. It seems that the practical procedure is to carry the $31,000 as unassigned or unabsorbed until burden rates are revised, in the normal course of events.

So far, the discussion has ignored the indirect manufacturing and commercial expenses which also susceptible to change as a result of a make-or-buy decision. The reduction in workers will affect the costs of processing payrolls. Purchase will eliminate all cost of recordkeeping up to the point where the purchased items come into the plant but, on the other hand, costs of the purchasing department may be increased. Changes in expenses in these areas can be handled basically the same way as illustrated for factory expenses and, therefore, further detailed comments need not be made.

Exhibit 2 illustrates the format of the report presented on the make or buy evaluation. The evaluation can be extended to show comparative return on investment by analyzing asset balances required under each of the alternatives and relating capital employed to profits. The presentation in Exhibit 2 is for the years after the year of change and thus does not take into account obsolescence on disposal of equipment or other costs of change-over. Where they exist, these

Effect on Profits of Making or Buying Parts

	Make	Buy	Higher (lower) if bought
Sales - annual	$600,000	$600,000	
Direct manufacturing costs	$400,000	$410,000	$10,000
Indirect manufacturing costs	10,000	12,000	2,000
Selling expense	45,000	45,000	
General administrative	45,000	37,000	(8,000)
Total cost	$500,000	$504,000	$ 4,000
Profit before taxes	$100,000	$ 96,000	$(4,000)
% to sales	16.7	16.0	(.7)

EXHIBIT 2

non-recurring charges should be shown in a separate section of the evaluation report and should not affect the recurring cost and profit figures.

Let us now turn to some of the intangible factors which must be considered in addition to cost analyses, to arrive at a sound make or buy decision.

Appraisal of Variation in Quality

FOR MAKING

One of the more compelling arguments for making, due to quality considerations, is that the desired quality cannot be purchased. The argument, however, has been weakened considerably over recent years with the expansion of industry and increased flexibility and know-how of the many industrial organizations. The argument can be effective, though, if new products or processes are involved, but even then the time period elapsing before suppliers can produce the items with the desired quality must be evaluated carefully before embarking on an extensive make program. If this time period is short and the cost of making high, two buying alternatives are available. The first involves redetermination of desired quality with a view towards buying substitutes until the originally desired quality is offered by suppliers. The second involves aiding suppliers in developing the desired quality, to shorten the time period even more. The two alternatives can be combined, also, so that substitutes would be used during the supplier development period.

When a company decides to make on the basis that desired quality cannot

be purchased, and the item is not a new product, caution should be exercised, since any company which attempts to produce a quality which others cannot attain may have high possibilities of failure. In some situations, a company may be in a better position than suppliers to control and improve quality by reason of the company's personnel being familiar with the needs of the company. This is not meant to imply, however, that it is always necessary or desirable to improve quality. Changes in specifications always should be approved by proper authority whether an item is made or purchased. With the advanced state of technical development of modern business, the argument that a company's own organization is in a better position to improve upon design, probably, is only rarely of great importance.

FOR BUYING

Most arguments for quality as a reason for buying are contradictory to those advanced for making. One of the most convincing arguments for buying exists when a company finds it impossible to make the desired quality. This situation occurs most commonly when either production processes or the items themselves are patented by other companies. The only alternatives are to buy or to change desired quality through use of substitutes.

A reason for buying, similar to the first, is that specialists in making a product should be able to do a better job than a company producing the same product as a sideline. From a technical point of view, it is likely that almost any company could attain the status of a production specialist in any chosen field, if costs were disregarded. The costs involved fall into two classes: (1) the cost of attaining the status of a production specialist and (2) the cost of production after attaining that status. It generally is the first class that is prohibitive and which makes a company, on a cost basis, decide to buy. Specialists also should be in a position to know more about methods of improving a product or reducing cost of production. In this manner a purchaser benefits in the research activities of suppliers. The result is that a purchaser is easily able to keep up with current developments and to maintain flexibility by being able to shift to new materials without risking loss of investment in existing production equipment.

It is difficult to generalize on the arguments discussed, since most of them, being contradictory, must be applied to specific situations and conditions. However, it appears that arguments based on quality favor buying rather than making, if everything else is equal, for the following reasons:

1. The experience of a specialized supplier in most cases is just as conducive to producing the desired quality as a company's own organization.

2. A purchaser benefits in the research activity of a progressive supplier and is, therefore, better able to maintain flexibility and to keep up with the times.
3. Buying avoids, for the purchaser, the costs of developing efficient production methods and processes or, in other words, the costs of becoming a specialist in manufacturing of a product.

On the other hand, two arguments tend to favor making:

1. Sometimes the desired quality cannot be purchased, although this is a relatively infrequent occurrence in modern industry. As a practical matter, this would be most likely to occur when a company wishes to preserve a trade secret and, then, a make-or-buy evaluation, as discussed here, is not involved.
2. If supplier cannot be depended upon to hold quality standards for each purchase, costs of inspection may be less expensive than if parts are purchased. This, however, may be included more properly under cost evaluation of make or buy.

Analysis of Quantity and Time

FOR MAKING

Most of the advantages for making, based on quantity, are based upon assurance of supply. The advantages can be grouped into two broad categories: (1) independence of distribution, whether by strike, interference with service, or otherwise, of outside suppliers and (2) independence of transportation delays and difficulties. These advantages, however, are not as absolute as they might appear to be. A company making a product may be as susceptible to delays caused by natural and semi-natural disasters, such as floods, fire and industrial accidents, as are its suppliers. Also, a company may be as subject to transportation delays on the materials needed for making as it is on the finished part bought from a supplier. It seems, then, that the only real advantage in making to assure a supply is where a company has better control over delays caused by the human element, such as errors and strikes, than suppliers have. However, this fact cannot be accepted as necessarily flowing out of a decision to make, and must be proved. Control over delays does not go automatically with making but must actually be attained.

Making assures a source of supply when a vendor is likely to discontinue making the required product. Also, if vendors are likely to raise prices and thus to remove the product from the availability of the buyer, making will assure a source of supply through direct production and through the effect of the policy on vendors to keep their prices down.

Arguments for making, based on quantity considerations, sometimes are advanced where the quantity needed is so small as to make production of the item unattractive to outside suppliers except at special-order costs. In these instances the company may be able to make use of some excess capacity to produce the item. Although quantity may be influential in this situation, the real consideration here seems to be comparative costs rather than quantity considerations as such.

FOR BUYING

Arguments for buying, based on quantity, as with quality, are principally contradictory restatements of the arguments for making. Assuming a company wants assurance of a source of supply, purchasing from several outside suppliers may give better assurance against delays than if the company manufactures all of its requirements. The principal advantage involved is comparable to that of insurance—spreading of risks. Thus, a constant supply is assured with only minor delays when one of several suppliers or transportation facilities from a particular supplier fails to meet delivery dates. The seriousness of delays is often increased where a company is completely dependent upon one source of supply, whether its own plant or an outside supplier. If, by depending entirely upon one source of supply, the company had severed connections with the market, it might find difficulties in establishing contact with other suppliers.

We have implied, so far, that it is always desirable to have an active source of supply. This may not always be true. If part of a company's operations were shut down temporarily, it would be relatively costly, but necessary, to shut down or curtail operations related to the part temporarily discontinued. This end most likely could be accomplished with less difficulty and cost if a company were purchasing instead of making the related parts.

Unless a company can make the item in question without having to purchase different materials, buying the finished component avoids new purchasing problems involved in obtaining the raw materials and supplies to make the product. These problems most likely would be only a temporary handicap and the related time element should be evaluated in giving weight to this argument for buying.

It may be decided to buy where quantities required are small in amount and demands are seasonal. For example, a company may decide to buy to meet peak sales demands rather than make and tie up capital in inventories and in equipment which is used only part of the time.

As with quality, generalization of arguments based on quantity is difficult because facts of each situation determine the applicability and importance of the arguments. With one exception, quantity arguments tend to favor buying, all other things being equal. The exception arises where the quantity is so large

that suppliers cannot provide the required amounts. However, if big demand is to continue, the scarcity of supply most likely will be a temporary condition until suppliers complete expansion of facilities. A company might not be able to set up its own production of the item much sooner than suppliers can increase capacity. A likely solution to a make decision under these conditions is for a company to buy out or merge with an existing producer and utilize all the production of the facilities acquired.

Consideration of Effects on the Business as a Whole; Internal Factors

Some of the broad considerations of make or buy, affecting the business as a whole, are related to the basic factors of cost, quality and quantity. However, their scope is generally greater than just the item involved in the make-or-buy decision. These and other broad effects will be mentioned here briefly as points that might be considered in any specific case. These factors can be grouped as being internal or external to the business.

Make-or-buy decisions definitely can affect costs, in the economic sense, in both the procurement and the manufacturing areas of production. An important factor in this area is the effect of make-or-buy decisions upon supplier goodwill. Many examples can be found of unusual service rendered by a regular supplier when a company is faced with an emergency. Although difficult to measure in dollars and cents, this service certainly affects the overall cost of doing business of a company. Supplier goodwill carries over into the distribution function of a business where a buy decision might be made in order to keep the goodwill of a supplier who also is a customer. This situation is probably less frequent than goodwill considerations in the area of production.

In recent years, decisions are increasingly influenced by the effect they will have on the labor force of a company through the union. As applied to make or buy, a buy decision resulting in decreasing a company's labor force may bring protests from the union which result in costly strikes and/or increased wage demands for remaining workers. This would be a cost consideration which should be made separately from the calculation of cost discussed previously. On the other hand, adoption of or threat of adopting a buy policy may be an effective means of lessening union demands.

Salability of a product can be a consideration in make or buy decisions. A company may have used advertising and promotion to create buyer preference for a product which it makes. Subsequently purchase of the product or components of the product could reduce salability if customers, becoming aware of

the fact, found that quality was being reduced, even if former quality standards, in fact, were maintained. Salability of existing products is given, sometimes, as a reason for buying a related item to complete a product line. In this case, however, salability only creates a make-or-buy problem; the decision to make or buy must be made after evaluation of the basic factors of cost, quality and quantity.

In the area of general administration, a decision to make may adversely affect the business as a whole, by overtaxing the time and ability of executives and supervisors. It is generally recognized that there is a limit to the variety of executive problems that can be handled by one man or one staff and functions might accumulate until some have to be neglected. This, in turn, can have an effect on overall profit performance of a company which, at the time of deciding to make, is an intangible factor, difficult to measure in dollars. Cost of additional personnel required by the make decision is, of course, more accurately determinable and should be included in calculations of cost.

Where company divisions exist, top management should review divisional make-or-buy decisions, based on divisional cost factors, with a view to the effect on company profits as a whole. For instance, assume that a policy is established to allow divisions to buy from the least costly source of supply. If Division A decided to buy from an outsider, instead of from Division B, the loss of Division B's profits may not be offset by the lower price paid by Division A. Consequently, there is a loss, from a cost and profit standpoint, to the company as a whole which results from what is a buy decision from a division-wide viewpoint.

Consideration of External Factors

Although it is more difficult to get the facts about external than internal conditions, their effects still must be considered, since they can be more far-reaching than internal conditions.

Probably the most obvious outside factor affecting business organizations is the business cycle. Most of the effects of the business cycle, such as future demand and costs, will be considered in calculating costs of making or buying. An intangible factor which might arise, however, is the desirability of making, to maintain employment for labor which otherwise might be unemployed because of a cyclical downturn which exists. If a company shifts from buying to making solely for this reason, the benefits of maintaining experienced labor and gaining worker goodwill must be weighted against possible additional costs of making and loss of supplier goodwill. Management should recognize the fact that a make-or-buy decision designed to meet current business conditions, whether

prosperity or recession, is, in a sense, temporary and most likely will need revision when the conditions change.

The points raised in this section on conditions affecting the business as a whole do not change the basic type of cost analysis outlined previously which should be made of make-or-buy problems. These points serve only to place emphasis upon the various arguments resulting from the cost analysis. The difficulty in considering these conditions, then, lies in assigning proper weight to them, in their relationship with the basic cost considerations. To achieve this, an objective approach is essential. In addition, a considered estimate of the effective time element of the external factors is necessary for a sound make-or-buy decision.

Pros & Cons — and In-Between Stages

As previously indicated, generalization of arguments for making or for buying is difficult since the specific facts of each problem largely determine the applicability of the arguments. It can be stated, however, that all things being equal, quality and quantity considerations generally will favor buying. Also, a make decision requiring additional investment most likely will result in continuation of manufacture even though it is less profitable in later years, because of the capital investment involved.

The question of make or buy for the most part has been discussed as if there were only two alternatives, make or buy. Actually there are in-between stages where a company makes part of its requirements and buys the balance. Therefore, many of the considerations, particularly in the areas of quality and quantity, must be weighted for the extent the company plans to meet its requirements by making and by buying.

Some Points to Watch in Studying the Fluctuation of Cost with Volume

by FRANCIS W. FEHR

A HOST OF PUBLICATIONS give the accountant the somewhat erroneous viewpoint that a wealth of data has been revealed on the fluctuation of cost with volume. A close look at the actual facts will disclose otherwise, partly due to the fact that the interpretations of terms applied to the sundry types of costs give a loose description without an equitable definition. The fact that many companies keep inadequate cost records also has a large part in the overall confusion.

Classification of Costs — Its Various Interpretations

The classification of costs differs in practice. Some accountants feel that the proper breakdown of costs is as fixed, semi-variable or variable. In many instances, however, companies will employ only a fixed-or-variable classification, feeling that two classes are sufficient.

Concerning classification, two points are outstanding. First, we do not classify costs merely for the purpose of identification but with the idea of wisely using this identification as a tool. Secondly, the accountant realizes that the accounting allocations do not specifically coincide with the variability allocations. Accounting categories are usually based on the kind of expenditure and not on its tendency to fluctuate.

The prime characteristic found in fixed costs is that, to the extent that they are wholly fixed, they incline towards uncontrollability, once incurred. They can be controlled at the moment of incurrence but once the decision is made to incur them, their controllability is limited.

It depends, to a large degree, on the level of management whether a cost is considered constant or not. Divisional management may have no control over certain costs and, therefore, they may be accepted as fixed. When viewed through the eyes of top management, the same expenditures may be thoroughly controllable. Foreman's salaries, for example, are the product of much planning by top management but, at the divisional level, they must be considered fixed because there is no control over them at that point.

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These various interpretations cause us to ask: Why is a fixed cost considered fixed? If the accountant understands this question thoroughly, he is well on the road to a proper defining of the subject. Generally, it is thought that, because a cost does not change even though the rate of operation changes, it is a fixed cost. Is the cost fixed due to a decision by management or is it inherently fixed? The question is very important. Looking deeper into the matter, the accountant finds that costs remain unchanged from one accounting period to the next because (a) a management decision has been made, (b) it is inherently fixed or (c) accounting policy dictates this interpretation.

As to the first category, there is a certain group of costs that are fixed costs only because management has decided that they shall be so classified; it is purely a management decision. Examples are: administrative expenses, supervisory salaries, advertising, some types of insurance, office salaries and standby factory expenses. The concept may differ from one company to the next but these items are usually considered as fixed costs. They are constant, however, only because management has so decided.

Inherently fixed costs can be changed only with great difficulty or under very unusual circumstances. They have a built-in fixedness. Contractual obligations, such as leases and rental contracts, are considered in this class. Property taxes and interest rates are inherently fixed. This does not mean that they cannot be changed (property assessments may be revised from time to time), but it is a difficult thing to do. While such changes are out of the ordinary, the point to remember is that even the most constant of the fixed costs are not always unalterable, they can be changed.

From the accountant's viewpoint, the main thing is that inherently fixed costs are controllable only at the time of their incurrence. For instance, when the firm is contemplating the purchase of a property, taxes on the property are controllable. Once the purchase is made, the firm has committed itself to a fixed tax charge. When a corporation is contemplating the issuance of bonds, the charge for interest and other expenses is controllable. Once the bonds are issued, the charge becomes fixed and is no longer controllable.

The third category of fixed charges is incurred by accounting policy. The charge for depreciation is the most common type of fixed charge of this nature. Several management decisions are also tied in with this type of cost. Whether to depreciate an item as an asset or to expense it as a current revenue charge, is the first decision to be made. Many times, regulations are governing in these situations, yet, to a degree, management may decide. Then, the length of life and the method of depreciation are to be considered. True, Government has issued certain tables of depreciation which most accountants follow for some

items, but the years of depreciable life vary on many other items. Whether to use straight-line method or unit-of-production method of depreciation, that is another point on which management has to make a decision. Straight-line, of course, becomes a fixed charge, whereas the production method is a variable charge. The use of accelerated depreciation method, which Government allows for certain industries, also illustrates the power of management to regulate the annual charge for accounting. This is, to be sure, a hangover from war-time costing methods but is still in practice today in the oil industry, for example.

Redefining Fixed Costs

When one considers all of these, it is plain that the common approach to fixed costs must be re-analyzed. Many fixed costs that have been viewed with rigidity as being uncontrollable, are made constant only by management decision or accounting policy and can be changed likewise.

Let us not forget the time element, the aims of the classification and the level of management that enters the picture. Expenses that with certainty can be controlled, may be considered constant for a given period. The range in which fixed costs are fixed generally is within a year or other budget period. The convenience of including administrative costs as fixed costs for a budget period is an influencing factor when setting up a fixed or appropriation budget. When fluctuations in volume occur to an extraordinary degree, whether upward or downward, management is forced to take another look at the entire budget, including fixed costs as well as all types of costs and conditions.

The intent or purpose of the cost is also a consideration. One department may consider a cost as fixed, while another department in the same company may consider the same cost as variable. Depending on the purpose to be served and the persons working with the accounts, fixed costs can be defined in both ways. Considering the periods of time involved, many items that are considered fixed in short term planning, are considered variable in long term planning, especially items such as long-term investments and their rate of return, or long-lived assets. Again the aim or intent to be utilized by the classification determines whether the time period involved is to be a long one or a short one. This, too, affects the classification. Any radical changes in the plant and equipment or organization methods and policies may cause a change in fixed costs. Usually, when a company's plant is more fully mechanized, fixed charges generally increase, even without an increase in volume or output. As a rule, variable costs then are lower.

To summarize, only under specific conditions does the concept of fixed cost

assume practical significance. When these conditions change, the classification and amount of fixed costs may also change.

The Approach to Variable Costs

When we see how fixed costs can be twisted in all directions, defining variable costs appears even more difficult. Most accountants assume the difference between fixed costs and variable costs to be clear-cut. This is not always so. Probably the easiest way to determine variable costs is to analyze which costs are fixed and assume that all others are variable.

The everyday interpretation of variable costs is that they fluctuate as volume or activity fluctuates. Two defects are immediately apparent in this reasoning. First, many reputed fixed charges can be made to change, as stated previously. Second, there is a tendency to assume an automatic relationship between volume or activity and the amount of variable expense. Under actual conditions this is a false assumption. Direct labor, in many cases, is not automatically related to volume. When work is brought down or volume is low, workers do not go home of their own accord. Some supervisor in charge of the department must take action, either by laying off personnel or assigning them to some other tasks. If they are assigned elsewhere, the type of the expenditure may change but the cost will not stop; it merely continues under another classification.

Between the two opposites—automatic regulation (as in the case of direct materials) and managed regulation (as in the case of day labor)—is a raft of cost items which can be subjected to automatic regulation in different degrees. As fixed costs were either inherently fixed or fixed by management decision so variable costs are either automatically variable or regulated by management action. So we see that costs and their classification vary from company to company, depending to a large extent on company policy. It cannot, therefore, be stated that, without exception, certain costs are fixed and others are variable. For example, labor in one company may be variable where the policy is to lay-off workers at the slightest sign of volume reduction (and to re-hire them when orders increase), whereas in another firm this cost would approach the nature of a fixed cost, considered in the light of a guaranteed annual wage.

There is a type of cost the accountant will come across which cannot be defined as belonging solely to one class or another. It generally means that there is a fixed element in many variable costs. Many accountants say that direct labor is a variable cost and supervision a fixed cost. In certain companies this may be a distinctly misleading interpretation. We feel that direct labor can be adjusted, within limits, to the rate of production and that there is a certain minimum below which it cannot go and yet permit production. In case of

production on the assembly-line basis, this is particularly evident. In this respect, direct labor is fixed and supervision variable both to a degree.

It is not enough to know whether costs are fixed or variable—how they vary with volume is much more important to know. Practically all of the other costs vary in different degrees, some reacting slowly to production changes and others more rapidly. This leads us to the interpretation of variable costs as either fully variable or semi-variable costs (sometimes called "stepped" costs). Those costs that are entirely variable react the same way as direct material costs and are directly proportionate to production volume. The semi-variables reflect a series of fixed levels for varying rates of production volume.

Variability Measurement

Is the cost to be measured on a company-wide basis or a department-wide basis? The former is used while determining a company's break-even point, whereas the latter is used generally for cost control purposes and budgeting. A more precise determination is generally provided on a departmental basis. This concerns pro-rated or assessed costs to the department that do not originate within the department. They are also termed service costs. Total costs are the data presented on the over-all basis, whereas the departmental costs are in the form of certain charges pro-rated or assessed against the department, and the method of pro-rating regulates the amount of expense assessed under different conditions of operations. When dealing with a particular cost center, it is always better to hold it accountable only for the items of cost directly under departmental control. The assessed charges should then be studied at their source, the cost center that provides the service.

There are three methods of determining fixed, semi-variable or variable costs and their degree of variability, i.e., how they vary with volume:

1. Observation of costs, with a final judgment as to their reaction at various volume levels, augmented by a ratio analysis.
2. Statistical formulas.
3. Engineering observations and reports.

Fairly close results but considered only approximate in nature can be achieved by choosing two periods of either a week or month (depending on what figures are available), which reflect two different volume levels of activity. Observe the fluctuation of the cost items, then, by comparing or collating them. This is sometimes referred to as the high-low method of comparison because the two volumes to be selected for comparison are generally of the highest and the lowest levels, if available. It is to be noted, however, that, when two periods are selected, only two results can be obtained, namely fixed and variable costs.

If the item of cost is equal for both levels of activity or production, it may be assumed to be of a fixed nature. If, on the other hand, the cost of store-room supplies is $1,000 in a month when production is 20 percent of capacity and $3,000 when production is 60 percent of capacity, it can be assumed that the cost is variable in direct proportion with the rise or fall of volume.

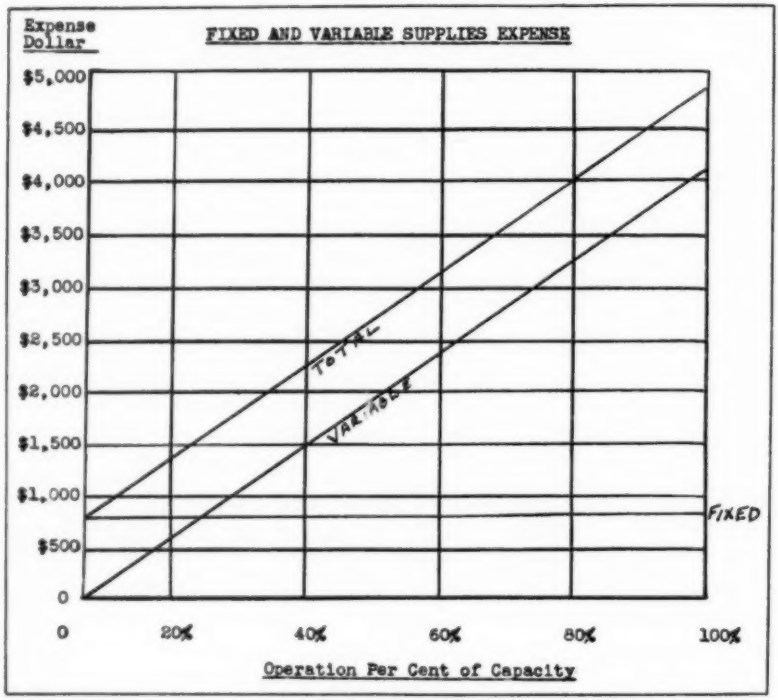

EXHIBIT 1

Sometimes, the situation occurs where the cost increases with volume but not in direct proportion. For example, if the same shop supplies amount to $2,000 at 30 percent of capacity, and $4,000 at 90 percent of capacity, the inference is that there is a certain amount of fixed cost within the total cost. In other words, it contains both a fixed and a variable element. These can be separated as follows:

	High volume level	80%	=	$4,000 total cost
subtract:				
	Low volume level	30%	=	2,000 total cost
		50%	=	2,000 total cost

Variable portion $2,000 ÷ 50% = 1% = $40

In this case, every percent of activity is equal to $40 of variable costs. Thus, if 30% activity represents $2,000 total cost, by subtracting $1,200 (30 x 40) variable cost, we come to $800 fixed cost. In this illustration, the fixed charges amount to $800 no matter what the level of activity. To prove the foregoing is to take the higher volume level:

	80% =	$4,000 total cost
80 ×	$40 =	$3,200 variable cost
		$ 800 fixed cost

In graphic form, using the above figures as the basis of calculation, the result would appear as shown in Exhibit 1. This is called linear variability but it may only appear to be linear. Upon further investigation, a different light may be thrown on the matter, as the following analysis reveals:

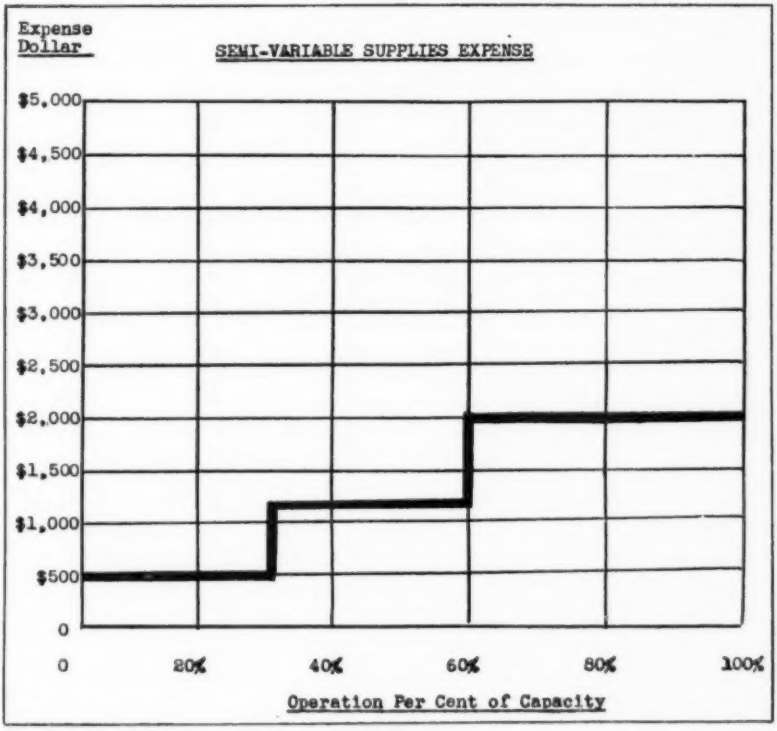

EXHIBIT 2

Cost between 0% and 30% ..... $ 500
Cost between 30% and 60% $1,200
Cost between 60% and 100% $2,000

An analysis of this sort reveals a disproportionate variability or a cost of a stepped nature. This is shown graphically as Exhibit 2. A linear presentation of such a cost would be misleading. This cost is of a semi-variable nature, rather than variable. The more points of observation included in the analysis, the greater the degree of accuracy in portraying the fixed and variable nature of the cost involved. A great deal of experience and wise judgment should be involved to determine whether an expense is of the linear variety, as shown in Exhibit 1, or would require further analysis. Direct linearity is often falsely assumed by the accountant but this is not the case when sufficient data are available. In most instances, the only data available is from two or three volume points. In this case, should there be numerous items to be analyzed, the errors in one will tend to cancel out. This is very tedious work which many accountants tend to avoid, especially if a large number of departments is to be considered.

Statistical Formulas Applied to Variability Measurement; Engineering Studies

Another method involves taking a number of activity rates and observing the total cost for each. When monthly data is to be accumulated, the accountant should be certain that a long enough period of time is covered, generally a year or more, long enough to include major changes in activity. The analysis would appear as follows:

Month	*Activity*	*Total cost*	*Month*	*Activity*	*Total cost*
January	30%	$ 900	August	70%	$1,550
February	30%	1,000	September	70%	1,600
March	50%	1,300	October	40%	1,000
April	60%	1,500	November	30%	950
May	80%	1,700	December	30%	1,000
June	90%	1,800	January	20%	800
July	90%	1,850	February	40%	1,100

The accountant would immediately take this fourteen-month study and rearrange the data on an activity level basis, ignoring the arrangement by month. The same data would then appear as:

Month	*Activity*	*Total cost*	*Month*	*Activity*	*Total cost*
January	20%	$ 800	March	50%	$1,300
January	30%	900	April	60%	1,500
November	30%	950	August	70%	1,550
February	30%	1,000	September	70%	1,600
December	30%	1,000	May	80%	1,700
October	40%	1,000	June	90%	1,800
February	40%	1,100	July	90%	1,850

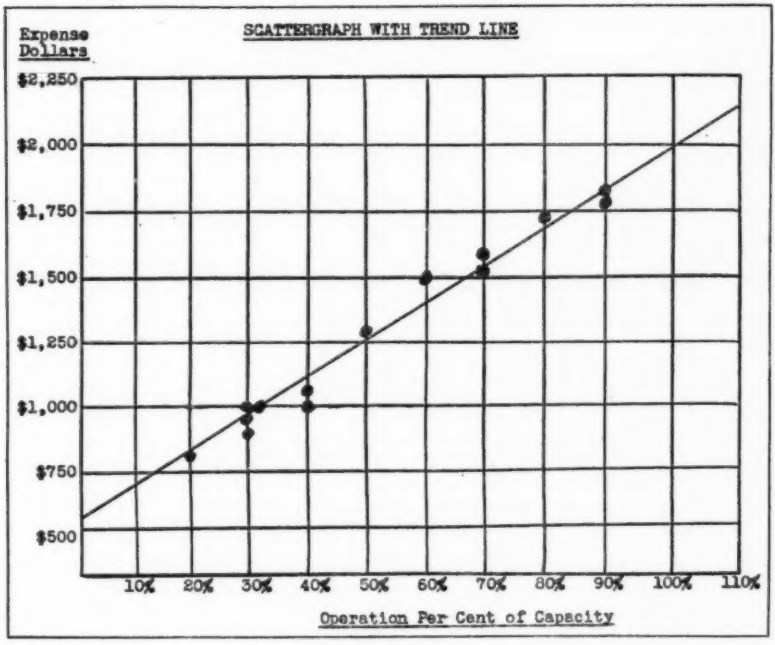

EXHIBIT 3

The next thing is to transfer the information to a scattergraph, as shown in Exhibit 3. After the dots on the graph have been accurately plotted, a trend line is fitted into the graph. Care is usually taken so that the same amount of dots appears above the trend as below the trend line, for greater accuracy. It can be seen that the trend line does not drop below $575. That amount is to be considered the fixed portion of the expense. The variable element is represented by the slope of the line, from $575 to $2,175. Since the difference, $1,600, represents the gain in the cost between 30 per cent and 110 per cent activity, it is reasonable to assume that, for every one per cent of increase in operation rate,

the variable expense rises $20 (1,600: 80). As a result, the total of this cost for any activity rate can be read directly from the scattergraph, or determined by adding to the fixed portion the variable amount for the indicated activity.

There is also the least squares method and several other formulas and methods for making a more accurate determination, which may be subject of a further research into this type of analysis.

The physical nature of production can also be ascertained by engineering studies to determine the fluctuation with volume. These studies are of the same nature as used for setting up a new line of production for incentive rate or other purposes. Interpreting the physical quantities into dollar values is the phase of operation generally assigned to the accountant.

In Summary

In understanding the fluctuations of cost with volume, the following are the major points to consider:

1. If the analysis is to be accurate, the cost records must be so.
2. Costs are fixed, semi-variable or variable but setting them up as such is only the first step; they are to be used as tools.
3. There is an element of variability in nearly all fixed costs, except those that are inherently fixed.
4. Fixed costs are either inherently fixed, fixed by managerial decision or by accounting policy.
5. Fixed costs are controlled at the point of incurrence but not thereafter.
6. The concept of fixed costs must be re-examined when abnormal budget deviation occurs. This is true of all costs.
7. The period of time and the purpose are important.
8. Costs that adjust automatically to volume are truly variable. Others have a "managed" adjustment through management action.
9. Both fixed and variable costs that are controlled by management vary from company to company as to the nature of their classification, which is of relative value only.
10. Variable costs may also contain a fixed element to a degree.

The foregoing ten points should always be borne in mind by the accountant in studying cost variance with volume. It is not enough to know which costs are fixed and which are variable. It is just as important to know how the variable cost varies with volume.

Integrated Statements as an Effective Management Tool

by RICHARD J. NAGY

THE ACCOUNTING FUNCTION, it seems to me, has an inherent ability to generate more detailed accounting and statistical information than is necessary for effective use in the managerial function. This is especially true of most businesses which operate with more than one product division. Therefore, it behooves both management and the accounting function to collate information needed with information available.

For the sake of simplicity, it can be said, without too much controversy, that our managements are primarily interested in knowing:

1. The current dollar volume of business activity.
2. The variable expenditures of funds which were necessary to secure that volume.
3. The amount that is "left-over," which can be applied toward expenses of the period under consideration.
4. The revenue retained, that can be applied toward further expansion, dividends, etc.

As a corollary to the above factors, management should also be interested in knowing the contribution of each division, product line, territory or functional activity to the total results of operations.

Reporting Performance and Results

The object and scope of discussion in this paper is to present how direct costing (1) lends to effective decision-making and (2) aids in the control over operations through crystallization of the effectiveness of the various responsibilities or functional activities in relation to achieving planned operating results and, also, to illustrate how these objectives can be achieved by:

1. Use of subsidiary or divisional earnings statements which show operating responsibilities involved.

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2. Comparison of actual operating performance with predetermined or planned objectives, as incorporated in the budget or forecasts for each operating responsibility or functional activity.
3. Organizing the presentation of consolidated results of operations, to show how each corporate entity or division contributes to the total revenues or expense shown in the summary of operations.

These accounting data are designed and organized to show the performance of each operating responsibility and, at the same time, integrating them, to show the over-all corporate results.

Organizational Background

To illustrate a multi-plant and parent-subsidiary structure, which simulates that of Clark Bros. Co. (Division of Dresser Industries, Inc.), Exhibit 1 is presented. As shown in this exhibit, each domestic and foreign corporation is an integral and operating unit in itself. The domestic corporations are further divided by major product divisions which are operated on a decentralized basis for accounting control and delegation of management decisions. Each corporate entity or product division maintains control over its financial and operating results. The solid line directed toward the consolidated group indicates flow of information necessary for consolidation and over-all financial presentation.

The marketing, administrative and research and development functions are

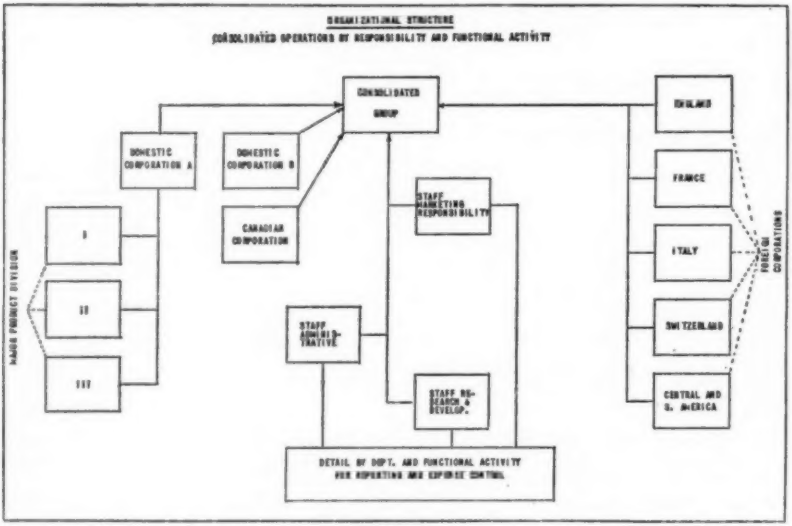

EXHIBIT 1

considered integral units for responsibility and expense control and for reporting to various top levels of management. A part of these functions also exists in domestic and foreign corporations, as well as the product division where they are considered a part of the direct operating responsibility.

At each level of the organization, there is a person responsible (with the necessary authority to act) for a phase of operations, function or activity under his control. Each person is in a position to control his own function or activity, and, therefore, becomes accountable for it to higher management. As a consequence, these operations, etc. are said to be controllable and are subjected to constant observation and reporting, so that corrective action can be taken when and where necessary.

Series of Statements Constitutes Integrated Reporting

Quite naturally, we ask ourselves, "How can we report on financial results of operations, by responsibility and, at the same time, summarize the information for management in a clear and concise manner?". In this regard, we, at Clark Bros. Co., have developed what we call integrated financial statements. These statements are devised in a fashion that facilitates the reporting to both the person who is directly accountable and top management in a manner which permits management personnel to see all parts of operations in relation to the whole. The integrated financial statements, themselves, are a series of reports of individual corporate or divisional as well as functional responsibilities. The individual reports, which consist of an earnings statement by corporation and/or division, highlight operating expenses in each area of responsibility.

In preparation, the integrated financial statements are assembled from data generated by each corporation or division, reported to the centralized accounting function and tied in to official corporate figures. When completed, they are examined from the top to the bottom, that is, from the consolidated balance sheet and earnings statement down through each divisional and functional responsibility.

The integrated financial statements consist of the following reports:

1. *Statement of Financial Condition* (Exhibit 2), showing the consolidated results as compared with profit plan and/or forecast, as well as the amounts shown in the books of each corporate entity.
2. *Earnings Statement* (Exhibit 3), showing actual results for the period as compared with plan as well as the year-to-date performance.

STATEMENT OF FINANCIAL CONDITION
($000 - OMITTED)

	DOMESTIC A	CORPORATION B	CANADIAN CORP.	BRITISH CORP.	FRENCH CORP.	ITALIAN CORP.	SWISS CORP.	CEN.&SO. AM. CORP.	ELIMI-NATIONS	CONS.	PLAN OR CURRENT FORECAST
ASSETS											
Current											
Cash	550	100	100	50	20	15	30	5		870	900
Notes - Accts. Rec.	1 900	50	200	75	60	10	10	25	(250)	2 080	2 200
Inventory	10 000	1 000	700	300	100	40	75	30		12 245	10 145
TOTAL CURRENT	12 450	1 150	1 000	425	180	65	115	60	(250)	15 195	13 245
Net Property, Plant & Equipment	4 500	1 000	500	150	50	20	85	20		6 325	6 400
TOTAL ASSETS	16 950	2 150	1 500	575	230	85	200	80	(250)	21 520	19 645
LIABILITIES											
Current											
Accounts Payable	300	500	150	50	10	10	30	10	(250)	810	900
Other Liabilities	6 500	300	250	75	90	35	50	10		7 310	7 000
TOTAL CURRENT	6 800	800	400	125	100	45	80	20	(250)	8 120	7 900
Capital & Retained Earnings	10 150	1 350	1 100	450	130	40	120	60		13 400	11 745
TOTAL LIABILITIES & CAPITAL	16 950	2 150	1 500	575	230	85	200	80	(250)	21 520	19 645

EXHIBIT 2

Earnings Statement

	Current Month			Year to Date		
	Actual	Forecast	Variance	Actual	Forecast	Plan
Net sales	10 000	11 000	(1 000)			
Variable C/S	7 500	7 700	200			
Variable margin	2 500	3 300	(800)			
% of sales	25.0	30.0	(1)			
CAPACITY COSTS						
Manufacturing	500	540	40			
Marketing	500	490	(10)			
Administrative	250	225	(25)			
Engineering	450	550	100			
Total capacity costs	1 700	1 805	105			
% of sales	17.0	16.4				
OPERATING EARNINGS	900	1 545	(645)			
% of sales	9.0	14.0				
Inventory adjustment (Fixed complement)	(50)	(25)	25 (2)			
Other Income	130	85	45			
Other Expense	30	90	60			
EARNINGS BEFORE TAXES	950	1 515	(565)			
% of sales	9.5	13.8				
TAXES (Federal, state & foreign)	495	795	300			
NET EARNINGS	455	720	(265)			
% of sales	4.5	6.5				

(Monthly to top management)

(Figures omitted)

(In actual use, notes, as exemplified below, appear at bottom of statement)

(1) For quick analysis of decrease from planned contribution margin (variable)

Actual P/V ratio	25% x (1 000) Sales variance	(250)
Forecasted P/V ratio	30%	
	(5%) x 11 000 Forecasted volume	(550)
Total variance		(800)

Of the $800 decrease in contribution margin, $250 is attributed to product mix and $550 due to sales volume not realized.

(2) Represents change in manufacturing costs allocated to inventories in current month.

( ) Represent income factor.

EXHIBIT 3

SUMMARY EARNINGS STATEMENT

	ACTUAL				PROFIT PLAN / CURRENT FORECAST				
	NET SALES	VAR. MAR.	CAPACITY COSTS	CONTROLLABLE EARNINGS	NET SALES	VAR. MAR.	CAPACITY COSTS	CONTROLLABLE EARNINGS	CONTROLLABLE EARNINGS VARIABLE
DOMESTIC CORPORATION A.									
Product Division I	4000	1000	430	570 (1)	4200	1260	422	838	(268) (1)
Product Division II	4400	760	230	530					
Product Division III	1667	200	50	150					
Marketing			320	(320) (2)					
Administrative			190	(190) (3)					
Research and Develop.			220	(220) (4)					
Inv. Adj.- Fixed Comp.			(80)	80 (5)					
Other (Inc.& Ded.) -Net			(120)	120 (5)					
TOTAL A.	10067	1960	1240	720 *					
DOMESTIC CORPORATION B.	1500	200	50	150					
Inv. Adj.- Fixed Comp.			30	(30) (5)					
Other (Inc. & Ded.)-Net			20	(20) (5)					
TOTAL B.	1500	200	100	100 *					
FOREIGN OPERATIONS									
Canada	875	175	150	25 *					
Great Britain	600	120	35	85 *					
France	75	15	5	10 *					
Italy	100	20	10	10 *					
Switzerland	50	10	5	5 *					
Central & SO. America	-	-	5	(5)					
TOTAL	1700	340	210	130 *					
Eliminations	3267								
CONSOLIDATED (Earnings before Taxes*)	10000	2500	1550	950 * (5)	11000	3300	1785	1515	(565)

(1) Exhibit 5 (4) Exhibit 8
(2) Exhibit 6 (5) Exhibit 3
(3) Exhibit 7

EXHIBIT 4

Corporate/Divisional
Earnings Statement

	CURRENT MONTH		
	ACTUAL	FORECAST	VARIANCE
Net Sales	4 000	4 200	(200)
Variable Cost/Sales	3 000	2 940	(60)
Variable Margin	1 000	1 260	(260)
% of Sales	25.0	30.0	(1)
CAPACITY COSTS-DIRECT			
Manufacturing	275	300	25
Marketing	30	25	(5)
Administrative	25	22	(3)
Engineering	100	75	(25)
TOTAL CAPACITY COSTS	430	422	(8)
% of Sales	10.7	10.0	
CONTROLLABLE EARNINGS	570	838	(268)
% of Sales	14.3	20.0	
Inventory Adj.-(Fixed Complement)	75	(50)	(125)
OPERATING EARNINGS	495	888	(393)
% of Sales	12.4	21.1	

This statement is used for each corporate or divisional activity for analysis and interpretation of current and year to date operations versus plan/forecast. Actual forms of Exhibits 5, 6, 7 and 8 contain three additional columns (Actual Forecast, P/Plan) for year-to-date figures.

(1) See note (1) Exhibit 3 for p/v ratio analysis; impact on contribution margin due to product mix and volume.

EXHIBIT 5

3. *Summary Earnings Statement* (Exhibit 4), which highlights the significant elements of each divisional, corporate or functional responsibility and which shows performance versus profit plan and forecast for major elements of revenue, cost, and profits. These are identified as net sales, variable margin, capacity costs and controllable earnings.
4. *Corporate or Divisional Earnings Statement* (Exhibit 5), for each major operating entity, i.e., corporate or division. These statements contain the significant elements of income and expense for each major operating responsibility and compare actual versus profit plan forecast on a month and year-to-date basis.
5. *Capacity Costs Summaries* by major function—selling, administrative & general and research & engineering expense (Exhibits 6, 7 and 8). They show the details of capacity costs shown on the summary earnings statement by operating responsibility and functional activity. This data is also arranged to show actual versus profit plan and forecast on a month and year-to-date basis, so that significant variances are highlighted for corrective action.

Capacity Costs Summary - Marketing

	MONTH			
	ACTUAL	FORECAST	VARIANCE	
DIVISIONAL				
Product Division I	30	25	(5)	(1)
Product Division II	50	50		
Product Division III	15	13	(2)	
TOTAL	95	88	(7)	
CORPORATE - (By Function and Territory)				
Local	90	100	10	
Eastern District	55	60	5	
Western District	65	63	(2)	
Industrial Agents	50	52	2	
Warehouses	60	70	10	
	320	345	25	(2)
FOREIGN CORPORATIONS				
Canada	20	5	(15)	
Great Britain	10	5	(5)	
France	10	15	5	
Italy	15	15		
Switzerland	5	10	5	
Central & South America	25	7	(18)	
TOTAL	85	57	(28)	
TOTAL MARKETING	500	490	(10)	(3)

(1) See Exhibit 5.
(2) See Marketing Expense Corporation A, Exhibit 4.
(3) Exhibit 3

EXHIBIT 6

Level-by-Level Reporting of Results

It is obvious that a complete set of integrated financial statements, as illustrated by Exhibit 9 and as shown in the other attached exhibits, covers each major area of responsibility and provides an analysis of each major element of revenue as well as cost and profit by these responsibilities, so that variances from plan can be directly related to the individuals who are responsible for controlling these functions.

For top management review, normally the first three pages of the statements, as illustrated in Exhibit 9, will provide the information on the performance of each major operating entity and the total combined results for the period. In addition, significant variations from plan are highlighted.

Capacity Costs Summary - Administrative and General

		MONTH			
		ACTUAL	FORECAST	VARIANCE	
DIVISIONAL					
Product Division I	(A)	25	22	(3)	(1)
Product Division II		15	15	-	
Product Division III		10	10	-	
TOTAL		50	47	(3)	
CORPORATE BOOKS - Administration (By Major Function)					
Executive		75	70	(5)	(1)
Controller		25	24	(1)	
General Accounting		60	60	-	
Industrial Relations		30	12	(18)	(1)
TOTAL	(C)	190	166	(24)	
FOREIGN (TOTAL)		10	12	2	
TOTAL	(B)	250	225	(25)	

(1) Areas for cursory analysis and brief explanation to top management, if required.
(A) See Exhibit 5
(B) See Exhibit 3
(C) See Exhibit 4

EXHIBIT 7

The divisional or corporate statements (Exhibit 5) are prepared for divisional or corporate managers for their use in reviewing operations under their direct control. The same information is made available to higher levels of management for review and appraisal of operating results and is summarized in Exhibit 4.

Total expenditures for selling, administrative & general and research & engineering expenses are summarized in Exhibits 6, 7 and 8 for top management use, if required, and presented to staff department heads who are functionally responsible for co-ordination of these expenditures.

It is obvious that the statements provide a means for pinpointing variances from plan by each major operating responsibility and facilitate preparation of summaries and explanations of these variances for top management use.

Integrated Statements Equal Effective Control

Presented with the facts incorporated in the integrated statements, decision-making levels of management are able to determine "out-of-line" performance

Capacity Costs Summary - Research and Engineering

		MONTH		
		ACTUAL	FORECAST	VARIANCE
DIVISIONAL - DIRECT				
Product Division I	(A)	100	75	(25)
Product Division II		60	80	20
Product Division III		60	85	25
TOTAL		220	240	20
CORPORATE BOOKS - (By Major Function, Activity, Etc.)				
RESEARCH & DEVELOPMENT:				
Product Division I		70	95	25
Product Division II		125	155	30
Product Division III		25	50	25
TOTAL	(C)	220	300	80
FOREIGN (TOTAL)		10	10	-
TOTAL RESEARCH & ENGINEERING	(B)	450	550	100

(A) See Exhibit 5
(B) See Exhibit 3
(C) See Exhibit 4

EXHIBIT 8

Integrated Financial Statements

Page 7 of 7	Research & Engineering	Exhibit 8
Page 6 of 7	Administrative & General	Exhibit 7
Page 5 of 7	Marketing	Exhibit 6
Page 4 of 7	Divisional Earnings Statement	Exhibit 5
Page 3 of 7	Summary Earnings Statement	Exhibit 4
Page 2 of 7	Consolidated Earnings Statement	Exhibit 3
Page 1 of 7	Balance Sheet	Exhibit 2

EXHIBIT 9

and institute plans for corrective action. Since the information is generated by the accounting staff in a form which facilitates the preparation of these statements, the information is made available to all levels of management within four days after the close of the accounting period.

We have found that the integrated series of financial statements eliminates much of the need for special analysis of "out-of-line" conditions which is so frequently encountered in conventional reporting, where operating responsibilities are not clearly identified. Most importantly, however, the integrated statements provide a quick and convenient method of reviewing and evaluating all segments of operations which may be responsible for variations from planned performance and, at the same time, highlights the major factors responsible for these variations. This enables management to use the statements as an effective tool for appraisal of performance.

The Accountant's Role in Policy Decisions Under Defense Contract Terminations

by E. P. JAMES*

EVERY defense contract issued by the Federal Government contains a termination clause and, in event of termination, is subject to the provisions of Section VIII, Armed Services Procurement Regulation. Therefore, the proper accounting handling of defense contract terminations is an important matter for the hundreds of firms across the country which do business with the Defense Department of the Federal Government, whether on a small or large scale. Since Section VIII, A.S.P.R., is the basic document governing final settlement of termination claims, its contents are of vital importance to industry in general and accountants in particular. Based on its regulations, the various services issue their own detailed implementing instructions which are also used by government personnel in the processing of termination claims.

The Department of Defense has been very cooperative with industry in obtaining its opinions and comments on changes proposed in Section VIII, A.S.P.R., and on actual experience with terminations in the field. In August 1957, the department released to industry a proposed complete revision to this Section and invited industry's comments. Various industry associations (including National Security Industrial Association, Electronic Industries Association, Aircraft Industries Associ-

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ation, National Association of Manufacturers, Chamber of Commerce of the United States and Machinery & Allied Products Institute) prepared written opinions on the proposed revision and submitted them to the Department of Defense. Joint industry-government meetings were then held at the Pentagon in December 1957 and January 1958 in an attempt to resolve differences.

Many accountants were present, pointing up the fact that termination regulations are of vital concern to the man in the financial field. In the final analysis, settlement of a termination claim is based on allowable costs plus a reasonable profit; the accountant's role in negotiating that settlement being a vital one.

The revised Section VIII, A.S.P.R., was issued in September 1958 as Revision No. 36 to the Armed Services Procurement Regulation. Many of the recommendations submitted in the final over-all industry proposal were accepted or partly accepted by the Department of Defense. Industry, however, is continuing to push its case for other recommendations not accepted, and the Department of Defense has indicated that it is willing to meet with industry from time to time to discuss possible future revisions based on industry's actual experience with termination problems.

At the latest joint industry-government meeting on termination held on November 17, 1959, at the Pentagon, industry presented statistics on termination experience under the revised Section VIII, A.S.P.R., and made further recommendations on proposed additional revisions. Among the topics discussed were: incentives for speeding up termination settlements, profit factors, settlement by determination and prime contractor claims.

On Nov. 2, 1959, the Department of Defense released as A.S.P.R. Revision No. 50 a comprehensive set of cost principles which apply to all phases of government contract costing, including termination effective July 1, 1960. These new cost principles (Section XV, A.S.P.R.) supersede the present ones contained in Section VIII. A.S.P.R. Since there are many costs peculiar to termination (such as settlement expense, subcontractor claims, costs continuing after termination, initial or "starting load" costs, loss of useful value of special machinery and equipment, plant rearrangement, preparatory expenses and special leases), industry is scrutinizing closely the new cost principles as they apply to termination and will want to discuss them at future meetings with the Department of Defense.

As we ride into the future on the wings of the space and missile age, we accountants in government contract accounting must be aware of the implications of termination, which looms ever larger on the horizon due to policy changes and swift technological advances obsoleting many products.

Performance Information through Responsibility Reporting

by GEORGE F. ARMSTRONG

THE COMPANY using the income statement described in this paper is a manufacturer of coated abrasives and pressure sensitive tapes. For many years, our company has had the same control tools as those generally used throughout industry, including fixed and flexible budgeting and manufacturing variance analysis. However, for as long as these tools have been used, they have been divorced from income statement preparation which made it difficult to mobilize them for statement analysis.

Expenses Related to Responsibility Areas

Quite recently, with the adoption of direct costs, it was found practicable to develop an income statement that, in addition to reporting the financial results of the month's operations, could also be turned into an effective top management control tool. The first step in doing this was to eliminate time-honored

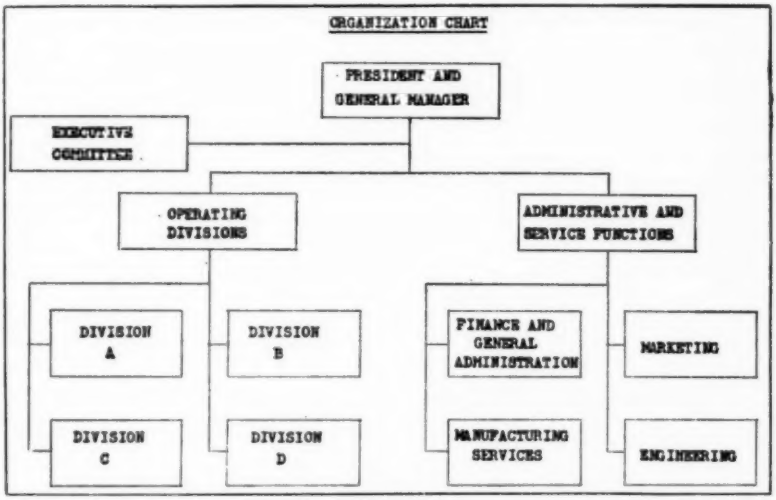

EXHIBIT 1

GEORGE F. ARMSTRONG, Albany Chapter, 1953, is Chief Accountant of Behr Manning Divison of the Norton Company, Troy, N. Y. Mr. Armstrong is a graduate of Harvard Business School.

indirect expense allocations and prepare the statement on the basis of responsibility accounting. Against the income from sales of an operating division are assigned only those expenses under the direct control of that division's manager. These include division administration, sales, manufacturing and technical expenses and, also, those of directly contracted services, such as maintenance labor from engineering. Exhibit 1 is an example of the type of organization referred to.

Division Income Statement

On each division income statement, division expenses are broken down categorically into two sections (1) directly variable product and selling costs and (2) division programmed costs, i.e., costs which do not vary directly with unit volume of manufacturing output or sales. Programmed costs also appear on the total company statement and may be defined as costs shared jointly by all divisions. On the organization chart these are the administrative and service functions. Division income, less its directly assigned expense, it termed "contribution to company programmed expense and profit." The contribution divided by the directly assignable assets of the division gives the contribution rate, also

Income Statement (in $000)

		A	B	C	D	E	F	G
		Forecast	Adjustments Vol.	Adjustments Other	Perform. St.	Actual	¢ per sales $	Variance from St.
Net sales	1	96	8	4	108	108	100.0	0
Assignable expense:								
Std. cost of goods sold	2	48	4	3	55	55	50.9	0
Fgt. cash disc., royalty	3	6	1	0	7	7	6.5	0
Manuf. variances	4	3	(1)	0	2	4	3.7	(2)
Total	5	57	4	3	64	66	61.1	(2)
Contribution to Div. Programmed expense	6	39	4	1	44	42	38.9	(2)
Programmed expense:								
Division admin.	7	1	0	0	1	1	0.9	(0)
Manufacturing	8	6	(1)	(1)	4	6	5.6	(2)
Technical	9	3	0	0	3	3	2.8	0
Sales	10	2	0	1	3	4	3.7	(1)
Advertising	11	2	0	(1)	1	2	1.9	(1)
Total	12	14	(1)	(1)	12	16	14.8	(4)
Contribution to company Programmed exp. & profit	13	25	5	2	32	26	24.1	(6)
Turnover	14	1.5			1.7	1.7		
Contribution rate	15	40%			51%	42%		(9%)

(Monthly to general manager)

EXHIBIT 2

shown on the statement. Included in the direct asset base are inventories, manufacturing machinery and manufacturing buildings. Although this is certainly not the entire investment required to operate the division, it appears to us to have great enough significance to be used in this calculation for the purpose of comparing operating divisions.

Exhibit 2 is an example of such a division statement. Column A is a monthly or quarterly segment of the approved forecast prepared at the time annual budgets are submitted. Column B is provided to make budget allowance adjustments to directly variable and semi-variable expenses for reasons of change in volume of sales and/or manufacturing. Adjustments to programmed expenses are by definition to the semi-variable items only. Column C provides for all other required adjustments brought about for reasons other than volume. For example, a price revision beyond the time of the forecast would require an adjustment in this column opposite net sales. The adjustment to the standard cost of goods sold is, as we use it, a measure of the inaccuracy of the product mix of sales in the original forecast. In another company, where forecasting techniques by product line have been further developed, this difference might appear as a variance from performance standard. All other adjustments in Column C represent budget revisions to the original forecast approved by the executive committee. The adjustments in Column B and C, when applied to the original forecast, provide the performance standard for the period of the report, as shown in Column D. The balance of the statement is self-explanatory.

Each division manager is provided, as a supplement to this statement, with a series of schedules providing greater detail on the net sales and each line of expense. Net sales and standard cost of goods sold are, for instance, shown by market area. Manufacturing variances are reported in segments of labor rate and efficiency, material usage, variable overhead, waste, etc. In the programmed expense area the schedules reflect the performance of major groups of departments within the various functions.

Company Income Statement

A consolidation of the division statements is made and reported on Lines 1, 2 and 3 of the company income statement, shown in Exhibit 3. Beyond this point are shown the company programmed expenses, each of which is the responsibility of a particular executive. Two responsibility areas, namely marketing and engineering, incur expenses which are directly contracted for by the operating divisions as well as general expenses necessary to perform the entire function. In order to reflect the performance of these areas in the framework of

Company Income Statement (in $000)

		A	B	C	D	E	F	G
			Adjustments		Performance		¢ per	Variance from
		Forecast	Volume	Other	standard	Actual	sales $	perfor. st.
Net sales	1	1675	50	30	1755	1755	100.0	0
Assignable div. exp.	2	1288	20	10	1318	1378	78.5	(60)
Contribution to company Programmed exp. & profit	3	387	30	20	437	377	21.5	(60)
Company programmed exp.								
Total marketing	4	220	0	0	220	222	12.6	(2)
Less: Assigned adver.	5	200	0	0	200	200	11.4	0
Net Marketing	6	20	0	0	20	22	1.2	(2)
Total engineering	7	182	(2)	5	185	187	10.7	(2)
Less: Assigned eng.	8	140	0	0	140	146	8.3	(6)
Net Engineering	9	42	(2)	5	45	41	2.3	4
Finance & gen. admin.	10	100	0	0	100	98	5.6	2
Manuf. services	11	28	2	(3)	27	28	1.6	(1)
Other expense	12	10	0	0	10	4	0.2	6
Total	13	200	0	2	202	193	11.0	9
Net profit	14	187	30	18	235	184	10.5	(51)
Less Fed. & state tax	15	105	17	10	132	103	5.9	29
Net Income	16	82	13	8	103	81	4.6	(22)
Turnover	17	1.3			1.4	1.4		
Return on Investment	18	15 %			19 %	15%		(4%)

EXHIBIT 3

total budgeted expenditure, without duplicating division expense, it was necessary to subtract assignable division expense on Lines 5 and 8 as shown in the exhibit.

In place of the contribution rate shown on the division statement, the last line of the company statement reports return on investment. The asset base used in this calculation now becomes total net worth. The schedules supporting the company income statement detail in the same manner as division schedules each area of company programmed expense.

As these income statements are the result of the combined efforts of the accounting and budgetary control departments, performance standards and actual expenses on the schedules may be examined in even finer detail from departmental performance budgets by type of expense.

Information Conveyed in a Timely Manner

Through the use of a Burroughs 205 Computer, this complete array of budget information is available in time for routine statement preparation. Managers of operating divisions receive their income statements and departmental performance budget reports approximately eleven working days after the close of the month. The division and company income statements are furnished to the executive committee and the general manager one day later. At the close of the

same week, the executive committee, including all operating division managers, meet to discuss these statements. This group is also furnished with a series of charts summarizing the salient features of the statements as well as balance sheet information. Generally, the charts show previous years in total, the current year by month and quarter average, and four quarters projected from the forecast. Because of the completeness of the presentation in chart form, provided in connection with examining trends and long range planning, it was thought to be unnecessary to summarize other than the current quarter on the published statements.

Well-Received by Management

A direct cost income statement, augmented by the additional information described, has transformed an otherwise ineffectual report into a valuable planning and control tool. A profit responsible management group is continually kept mindful of the original profit objective for the period. Subsequent approved deviations from that objective reappear on each statement and are re-evaluated in light of current performance. Furthermore, accounting by organizational lines has made it possible to direct attention to the appropriate responsibility and to do so through the income statement. Performance is no longer evaluated on the basis of last year or last month; each period has its own performance standard and accounting "gimmicks" have no place in the explanation of differences.

This straightforward and understandable approach has been well received by our management. Especially among its nonaccounting trained members, the sentiment seems to be that a financial statement has finally been turned into a management tool.

Beyond These Covers

Books

Accounting and Costs as Tools of Management for Control and Analysis

Adolph Matz, International Cooperation Administration, Washington 25, D. C., 1959, Paper Bound, 197 pp.

The result of a mission to assist a Central American nation in aspects of industrial practice, this reproduction of six lectures so utilized comprises a compact text on the applicability of accounting in industry for planning and control. Flexible budgeting and direct costing are explained and illustrated. Financial analysis is likewise treated.

Selected Papers 1958

Haskins & Sells, 2 Broadway, New York, N. Y., 1959, 454 pp.

Here reproduced are some 35 articles by members of the Haskins & Sells organization on a wide range of accounting and, sometimes, more general subjects. A few titles are "What Can Be Done Currently to Improve Educational Preparation for Accounting Practice," "Some Accounting Problems in Business Combinations," "Audit Problems Relating to Electronic Data Processing," "How Computers Are Applied to Accounting Functions" and "An Effective Approach to Control Report Problems."

Accounting Manual for the Crushed Stone Industry

National Crushed Stone Association, 1415 Elliot Place N.W., Washington 7, D. C., 1958, Paper Bound, 59 pp., $15.

Offered as "a comprehensive management control system," this manual, the predecessor of which was issued in 1937, includes material on cost data establishment, preparation of operating budgets, standard costs and reports to management. Percentage depletion is also the topic of a section of the manual and a wide number of "suggested forms" is supplied with such divergent uses as "flash reports," "follow-up report of savings" (on capital outlay) and "historical summary of repairs to equipment."

Equity and Loan Capital for New and Expanding Small Business

Harold T. Smith, W. E. Upjohn Institute for Employment Research, 1959, Paper Bound, 104 pp.

Not only pertinent material related to this book's title but also much expository matter considering the situation of small business and its importance to the economy is included in this study. Private, state and community sources of funds are dealt with, together with facilities provided through the Small Business Act of 1953.

Federal Income Taxation

Robert S. Holzman, Ronald Press, 15 East 26th Street, New York 10, N. Y., 1960, $8.

Designed to serve as a text book in courses in Federal income taxation, this volume is subtitled "Tax Principles and Tax Planning." As noted prefactorily, the presentation follows through from income to deductions to computation. Procedure with Internal Revenue Service and the courts is also treated in good measure. Tax forms make up the appendix.

Cases in Business Administration (Bibliography), Vol. IV

Inter-Collegiate Case Clearing House, Boston 63, Massachusetts.

A brief abstract, course to which applicable, the setting, company positions involved, and source and availability are provided

for each of the nearly one thousand cases listed here. The list is classified as to cases dealing with controls, finance, general management, human aspects of administration, marketing and production. It is stated that the Intercollegiate Case Clearing House has in stock most of the 1,745 cases mentioned in the four volumes of the bibliography to date and that the fifth volume is in process, with entries desired. (An entry form is bound in.)

Gasoline Pricing in Ohio

Edmund P. Learned & Catherine C. Ellsworth, Harvard Business School, Boston 63, Massachusetts, 1959, 258 pp., $9.

Pricing in a leadership (but also competitive) situation is explored with considerable intensity in this study based "mainly but not wholly" on the period 1950-1955. Price-volume relationships are emphasized. The book is replete with tables and charts.

Meeting the Productivity Challenge

American Management Association, 1515 Broadway, New York 36, N. Y., 1960, Paper Bound, 102 pp., $3.

Issued as Management Report No. 40 and subtitled, "The Nature of the Challenge and Some Practical Approaches," this presentation gathers together a dozen papers on a topic of background interest to accountants. Among relevant titles are "Achieving Productivity Through Organization Planning" and "Increasing Individual Productivity Through Motivation Controls."

Management Services by C.P.A.'s (Bulletins Nos. 1 to 4)

American Institute of Certified Public Accountants, 270 Madison Avenue, New York 10, N. Y., Paper bound, 1959 & 60 (pages & price—see text below).

Comprising the initial numbers of a series of *Bulletins* (No. 5 is planned for June issuance), directed to members of the Institute and others interested, the present group includes an introductory bulletin on "The Concept of Management Services by C.P.A.'s" running 19 pages and not marked for price. Bulletins Nos. 2 to 4 are, respectively, on "Budgeting for Profit in Small Business," "Financing the Small Business" and "Cost Reduction and Cost Control in the Small Business." Each of these runs over or under 75 pages and is available at $3.50, with the series as a whole available at $10.

The study represented by each of the series so far issued bears, as suggested by the titles, on the situation of small business and their consultants, and are phrased and presented for impact under current business conditions. Case summaries figure in the presentations.

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